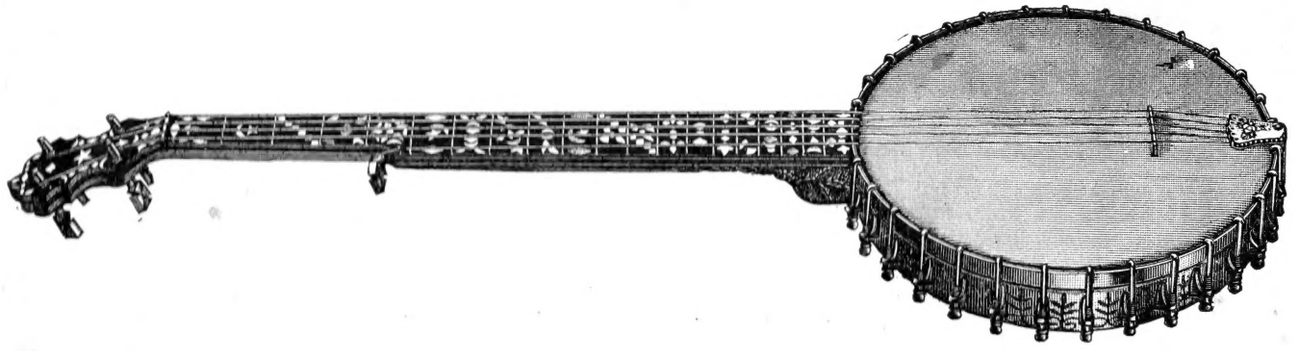

"THE BANJO PHILOSOPHICALLY"

Its Construction. Its Capabilities. Its Evolution.

Its place as a Musical Instrument. Its Possibilities and its Future

A LECTURE

By S. S. Stewart.

ALSO AN EXPOSITION OF THE "HARMONIC TONES" AND THEIR PHILOSOPHY.

PRICE, 10 CENTS.

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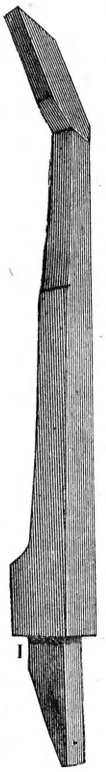
BANJO NECKS.

Few would recognize in the symmetrical and finely finished banjo neck of to-day, any semblance to the neck of the old plantation banjo of thirty years ago. This might be said of almost any part of the instrument however, as well as of the neck, but in this instance we are writing and illustrating the banjo *neck* alone, not treating upon the banjo generally.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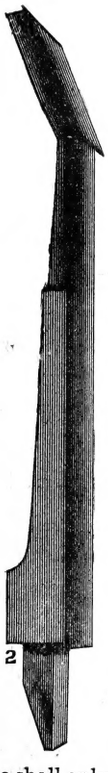
The neck, handle, arm or stock of the banjo (we use the term *neck*, as it appears to be more in general use than any of the other names) may be constructed from various kinds of woods, as we have stated in "*The Banjo Philosophically*" and other treatise, and our purpose is now to tell how the necks are made, and as they are now being constructed at S. S. Stewart's Banjo Manufactory in Philadelphia.

By way of illustration, we present a number of cuts to convey an idea as to the appearance of the neck in its several stages of manufacture, but were we to undertake to present cuts or diagrams of the neck at every different stage or process of its construction, it would require some twenty or more different cuts, which we have not space for at present. We will illustrate only the making of one of our fine necks such as is put in a banjo costing say from $40.00 or $50.00 and upwards. Illustration No. 1, represents a neck after being "band sawed." This is just as it is sawed out of the plank, and before any veneers have been put on. Those of our readers who have seen the necks band-sawed at Stewart's, or those who are familiar with the band saw, will understand just what the cut represents. The projection piece at the heel end of the neck, as shown in the cut, is left there merely for convenience in handling the work, during the making of the neck, holding same in vise, etc., and is cut off after a certain stage in the work has been reached. After the necks are band-sawed from the planks it is customary to allow them to stand in racks a few weeks before proceeding with the veneering. For it is a known fact with practical workmen, that no matter how well seasoned the plank may be from which the necks are sawed there is almost certain to be more or less warping and shrinking of the wood after it has been sawed and the outer surface removed. Therefore to proceed at once with veneering without allowing the wood time to shrink is a hazardous undertaking for fine work.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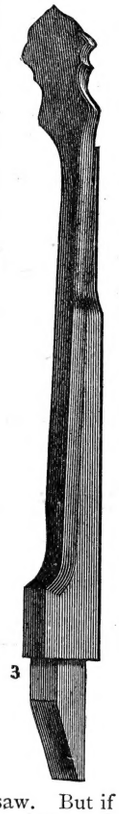
We propose soon to illustrate banjo making in general, showing cuts of the various machines etc., in use at Stewart's factory at the present time, but in this article we shall only speak of banjo necks, and that as briefly as the subject will admit of.

After the sawed neck is ready for veneering (the face having been planed perfectly level), it may be veneered with a single thick strip of ebony or rosewood, or with several thin veneers as the case may be. It is however customary in the finer or high priced instruments to use several veneers together with the ebony strip. Each veneer is layed upon the face of the neck with the hot block commonly used for veneering purposes, and after the glue has become thoroughly dry the clamps and block is removed and the same process gone through with on that part of neck known as the "peg-head" or "screw-head." Now as there are frequently seven strips glued upon the face of neck and the same number upon the "peg-head," each of which requires a separate clamping, and as time must be allowed for each veneer to become firmly set and dry before another is glued on, it will be seen that it is a matter of several days time before the neck has assumed even the crude appearance in Cut No. 2. Then it must be taken to the band-saw again and the superfluous wood together with the glue which has been pressed out from between the veneers and become hard, removed. Now if the neck has remained perfectly straight and shown no signs of warping or cracking, it is ready for the scroll saw. But if on the contrary, it shows any appearance of warping, it is layed away for a time in order to give the wood time to set. Supposing the neck now to be ready to proceed with the making of, the peg-head or scroll is marked out from a suitable pattern and then sawed—which may be done either by hand or by power—as in either case the work must be dressed off with a rasp and brought up perfectly to the line.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Now the neck is ready to be shaped or roughed out. This may be done with a draw knife by hand or may be done by a revolving file (or knife), a tool used for wood carving, which has a circular shape, and is attached to a lathe running by steam-power, very rapidly.

The neck having been brought into proper shape, the next step is to sand paper. For this, various grades of sand paper are attached to different wooden circular shaped blocks which revolve on a lathe. After this has been done the neck is ready for real finishing work. It must now be carefully gone over with fine sand paper by hand before a coat of varnish or wood filler is put on. Then on being varnished and becoming perfectly dry the entire coat of varnish is sand papered off by hand again. This has been done to produce a moderately clear and smooth surface. Now if the neck is intended for a very fine banjo, it is ready for the *carver*, and may be carved similar to what is shown in Cut No. 4. (This is similar to the style of carving on our hundred dollar banjo.) During these processes the piece of wood at heel or butt of neck has been left on for the purpose of holding the work during carving, varnishing, etc. This piece is finally removed by the band saw, but only when the neck is wanted for use or is ready to be fitted to a rim.

The pearl position marks or pearl work in peg-head is all inlaid previous to cutting off the superfluous wood at base of neck, as this renders the work so much easier to handle. If the neck is to be handsomely and elaborately inlaid, the pearl for which is sawed out and filed up in advance, there may be several days (or sometimes weeks) work yet on the neck, and as frequently as many as seven different coats of varnish must be put on the neck proper—each of which is sand papered off before polishing—it will be seen that before the neck assumes an appearance similar to that shown in Cut No. 5, it must have "gone through the mill," so to speak. It has been handled by several different workmen, all of whom are masters of their various branches of the trade. The wooden piece which extends through the rim (sometimes called the sound bar), is set into the neck proper after the work is completed and ready for polishing. Sometimes the neck is constructed throughout of one solid piece, but it is generally conceded a better piece of work if the extension piece or sound bar is made from a separate piece and let into the heel of the neck. At all events the bar is less liable to warp or spring when so made. The object in making a neck with a number of veneers is not only to present a more beautiful appearance, but also to add greatly to the strength of the neck, rendering it less liable to warp and giving it a greater power of resistance to the tension of the strings.


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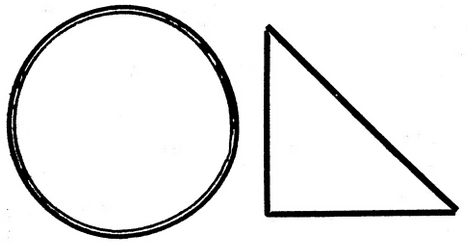
Where a great deal of inlaying in pearl or wood is put in a banjo finger-board, it is better that such a banjo should be made with raised frets. For otherwise the friction of the strings, together with the pressure of the fingers (which must be much greater on a smooth board than with raised frets) is apt to sooner wear the finger-board and cause the strings to jar.

The less pearl or other inlaying a professional player who travels about has in his banjo finger-board, the better—for it is so much quicker and easier to repair a neck in case of jarring of the strings caused by warping or wear.

To say that a neck will never warp under any circumstances is to go outside of reason and common sense. A man might as well say that he would never get sick no matter where he traveled. A neck that is carried from place to place in variable climates is of course more apt to warp or change than a neck which is kept in an even temperature, and as the making of a perfect neck has been made a scientific and philosophic study at Stewart's factory, we can assert that there is no neck made which is so well calculated to give perfect satisfaction as those in the Stewart Banjos.

It will be seen from this brief sketch that many weeks must elapse before the rough plank,



The Banjo Philosophically.

Its Construction, Its Capabilities, Its Evolution, Its place as a Musical Instrument. Its possibilities, and Its Future.

A LECTURE,

By S. S. STEWART.

I have selected as my subject THE PHILOSOPHICAL PRINCIPLES OF THE BANJO AND BANJO PLAYING. More properly speaking, I should say, THE PHILOSOPHICAL BASIS ON WHICH THE BANJO IS CONSTRUCTED, AND THE PHILOSOPHY OF BANJO PLAYING.

I have here several banjos and parts which it is my purpose to introduce, and which I shall use as objects of illustration during the course of my lecture.

I ask your attention, for a short time, to my remarks, and I will endeavor to bring before you, in as unpretentious manner as possible, the different classes and grades of banjos, and notice briefly the various changes which have taken place in the instrument during the past thirty years, during its process of evolution to its present state of progression.

The banjo is, as you all know, an instrument of the stringed class, and may be associated with the guitar, lute, mandolin, bandore, etc.

I believe, and it is so stated by other authorities, that the banjo got its name from the *bandore*, and that it is not of negro origin as has been claimed.

The *bandore* some of you have heard played, when you listened to the Original Spanish Students.

It is of ancient origin and the name banjo is thought to have been corrupted therefrom.

There is no such instrument as a *bandoline*, so far as my knowledge extends, although I have heard that name mentioned in connection with banjos.

Bandoline, as I understand it, is a hair oil or pomade, and can have no signification here.

The name *Banjeaurine* has been given to a somewhat modern style of banjo of my own manufacture, and of which I shall have something to say presently.

I mentioned some time ago in a small publication relating to the banjo, that an Egyptian Lyre of the Ancient Egyptians had been seen by a certain writer, which was in every respect a modern banjo. I believe that the hoop or rim of this lyre was oblong or oval, and not circular, like ours—hence it was not a "modern banjo."

However, it is not my purpose to delve into by-gone ages, searching after fragments of the past—at least not at this time; nor is it my purpose to dwell upon the origin and ancestry of the present banjo, nor to occupy any more of your time by dwelling upon or discussing as to where, why, when and how the banjo got its name.

We all admit that it has a name and that its name is banjo—b–a–n–j–o or b–a–n–j–e–a–u, but not b–a–n–j–e–r. This is sufficient.

The instrument, as it stands, is composed of a circular frame or rim, over which a membraneous substance, called the head, is stretched. This head being elastic acts as a sound-board, as does also, in a manner, the wood or other material in the rim or circular frame.

The instrument, like the guitar and other instruments of its class, has a neck; from the extreme end of which strings are stretched, extending over the head, across the circular frame.

A small piece of wood is fashioned into a "bridge," upon which the strings rest, and by which their vibration is conducted to the head. Without this small appendage, the bridge, the instrument would be worthless.

The banjo differs in the tone produced, as well as in its shape and general appearance, from the guitar and other instruments of the same class.

The strings vibrate, and are treated in a similar manner to the strings upon a guitar, but the philosophy and scientific principles of the construction of the instrument are different.

In the banjo the head combines its vibration or pulsations with the vibrations of the strings, and the rim acts in unison with the head as a peculiar kind of sound-board. But of this I shall have more to say later on.

THE EARLY BANJO.

Should any of you open *Moore's Encyclopedia of Music* at page 90, and there read its description of a banjo, you would possibly be led to believe that the banjo was not much of a musical instrument. And you would infer rightly; for at the time the *Encyclopedia* was published, in the year 1854, I believe, the banjo was considered, as some have it, purely an instrument of accompaniment. In those days no one supposed that the banjo would ever become a recognized and favorite musical instrument, or that it could ever possibly become a favorite with the ladies.

Time works great changes, and yet I have no doubt that many there are who still have no other conception of the banjo than as described in Moore's and other Encyclopedias.

About the first player upon the banjo I have heard spoken of was Joe Sweeney, of Virginia. Before his day the instrument is said to have been a "three-string gourd," and played by one Picayune Butler, of whom many of you have heard. There was a great old-time "banjo song," said to have been sung by him, called "*Picayune Butler's Come to Town.*"

But as Picayune Butler's Three String Gourd bears as little relation to the present banjo as the ancient *Viol* does, or did, to our present *Violin*, the king of musical instruments, I deem it worthy of but brief mention at present.

Sweeney, aforesaid, is said to have added the third and fifth strings to the "three string gourd" and made it, what was at that time called a banjo.

The banjo at that time had no hoop and system of screw hooks to tighten the head. The head or skin was usually fastened to the rim with tacks and cement.

The head, after being wet, was stretched over the circular rim, which was usually of ash wood, and then fastened and allowed to dry.

When the head dried it of course contracted and became firm and tight. We have still in use almost the identical system for putting heads on tambourines, but the old-fashioned "tack head" banjo has gone out of date—burned out, like a taper or tallow dip, which has given place to the lamp, gas jet and electric light.

Following the "tack head" banjo came the screw-head banjo with solid iron band or hoop and iron brackets and screws.

It was no longer necessary to hold the banjo near a stove in order to cause the head to contract and become tight when the weather was damp, as the nuts upon the hooks could be screwed up and the hoop drawn down in a somewhat similar manner as it is done to-day.

But the banjo at best was a very crude instrument. The system, or mechanical part of the same, was very unfinished, and the heads in use were generally made of sheepskin, and were not calculated to stand the strain which those used to-day are put to.

The necks, too, were very crude, and generally had a piece of wood sliced out of the butt-end, adjoining the rim and hoop, as nobody ever thought of playing "Away up There" in those days.

Then, too, the instrument was strung with thick strings and tuned to a low pitch, and the style of execution was entirely the old "stroke," or original "banjo style." Nobody "picked" the banjo then in what is now termed "guitar style."

They used to make the banjo rims in those days at least three inches in depth, which made them look clumsy and "tubby."

In those days there was a banjo maker in New York by the name of Jacobs. He is spoken of as the first "professional banjo maker," or first maker of "professional banjos."

That means that he did not make fancy banjos for the ladies to decorate with ribbons and hang up in their boudoirs, but he made a good, solid, strong, heavy-built banjo, which was calculated to stand the hard knocks of the minstrel stage.

I have never, so far as I know, seen or played upon one of Jacobs' instruments, but I think if I could produce one of them that you would scarcely recognize in it any resemblance to our favorite "silver-rim" banjo of to-day, now so popular.

Jacobs was evidently an industrious German, and returned to his native land with a small fortune, made by hard work and saved by frugal living.

It may be that he introduced into Germany the patterns from which some factories are still turning out banjos, but I hesitate to charge an honest man with such a crime.

However, Jacobs lived and made his banjos before my time, that is, before I saw the light in this world; and I will refrain, therefore, from raking over the ashes of by-gone days, now buried in oblivion.

From time to time improvements were made in the banjo as it developed in the hands of new performers. Mechanics here and there improved its various parts, and gradually musicians "took hold" of it.

More brackets were added to the rim; some makers narrowed down their rims a little, and also shortened their necks, and then banjos began to appear having polished brass or German silver brackets and hooks instead of iron. A gaudy brass plate was sometimes set into the neck as a part of the finger-board.

Players began to execute music in the guitar style of playing, and the instrument became a great attraction in all minstrel shows.

G. Swayne Buckley was one of the first who added the guitar style of *frets* to his banjo, although I believe that he played almost entirely "banjo" or "stroke" style, and therefore his wisdom in using *frets* (raised frets) was doubted by many.

At that time scarcely any performer used frets, raised or otherwise—on a banjo neck.

Indeed there would have been little use for them with most of the "great banjo soloists" of that day, as they never thought of stopping the strings beyond the fifth string peg. The gigantic effort required in making a *barre chord* on the banjo then used was not to be indulged in by any, save those of advanced musical views and good physical development.

I have endeavored to be as brief as possible in my remarks, as the ground already covered is but an introduction to what follows.

I will, therefore, now take up the THE BANJO—*the silver rim banjo*—which I consider the only true banjo, and endeavor to philosophise and analyze the instrument in as few words as possible.

THE "SILVER RIM" BANJO.

Just as there are enormous numbers of trade fiddles, cheap violins, turned out of the great toy shop of the world, Germany, and sold by our music stores throughout the land, so there are factories in this country, where large numbers of cheap banjos are manufactured and supplied to the trade,

The old style "tack-head" banjo is scarcely found in a music store to-day, but it is sometimes to be found at toy stores, where they are disposed of to young ladies, some of whom purchase them for cheap decorating purposes. But the majority of banjos turned out by the "cheap factories" at this time are metal covered rim banjos, with nickel plated mountings and walnut necks. They are made in imitation of the Standard German Silver Rim "Professional" Banjo, and sold to beginners and learners of the instrument. Nearly all of my recent customers have had at least one of these cheap banjos. In fact I prefer that such should be the case, as a person who

has been in the habit of playing upon a poor instrument is all the more ready to appreciate a good one when he gets it, although it may be that his "musical ear" has become deadened to some extent.

Many of you have heard of the old "Troy Banjo." A few years ago these banjos were in use by many players upon the stage and thought much of. They were made by two makers: The first was Albert Wilson, an eccentric genius, who was much liked by many players of his day. Wilson was followed by a maker named William H. Farnham, who followed the style originated by Wilson, without attempting any important improvement. These banjos were generally of 10½, 11 and 11½ inch rim. The necks were bolted fast to the rims, there being no wood or metal bar extending from the neck through the rim as there is in nearly all banjos of the present day. The absence of this bar caused the neck to constantly work upwards, and the banjo could not be depended upon to remain in tune.

The rims of these instruments were constructed upon the same principles as those of to-day. A maple wood hoop, covered with sheet German silver, and turned down at each side over a wire ring. But the work was more crude at that period, and the rims, although very strong and solidly made, were not capable of giving the vibration of those produced and used this day in the Stewart Banjo. This is a well attested fact.

The "Clarke Banjo," an improvement on the Wilson and Farnham Banjos, became a general favorite among minstrel and other stage performers.

Clarke's Banjos were made by the late Jas. W. Clarke, who continued to make them until the time of his death, which was caused by consumption, and took place in New York City, on February 27th, 1880. Clarke's Banjos, as I have said, were an improvement on the Wilson or Farnham instrument, as Clarke added the extension bar to the necks, making the instrument more solid in construction, and more sure to remain in tune. But I do not mean to say that Clarke was by any means the inventor of this improvement, or that it was of his own origination, for the majority of wood rim banjos, even before that day, were so made. But every manufacturer of a musical instrument leaves the impress of his individuality in his work, to a certain extent. This is a perfectly philosophical and a well known psychological fact, and governed by a psychological law.

Outside of this, Clarke had his little secrets in regard to his methods of work, just as every skilled workman and specialist has to-day, and as well, many little points which would scarcely be of much service to another maker, for every true genius has his natural and original ways of working.

Clarke's Banjos were noted for their loud and sharp tone, it being a standard among professional banjo players, that if you wanted a "sharp banjo" you must get a Clarke.

There are makers to-day, who, instead of branching out and studying their subject, and endeavoring to get up instruments better than others, which is the only legitimate way in which a demand for their instruments can be created, are content to plod along, copying the *Clarke Banjo* and the patterns of other makers.

Such makers very seldom amount to anything. No two men have the same individuality, and hence it is folly for one man to copy another. The true banjo maker needs no copy, his model is formed in the mind, and he works out his own ideas. Those makers who possess no ideas of their own had better, far better, try some other means of gaining a livelihood.

On the other hand, we have manufacturers who are constantly inflicting upon the banjo what they are pleased to designate as "improvements," some of which are patented.

We have had patent-closed backs, patent hoops, patent hollow rims, patent bell rims, patent keys, patent bracket protectors, patent tail pieces, patent mute attachments, patent arm rests, patent sound-boards and a variety of other patents; but none of these have added one jot nor tittle to the musical value of the banjo.

The "silver-rim banjo," as described, has been for years past the standard banjo; THE BANJO among professional players of note, and the number of "patent banjos" of any kind in use by noted players, or even skilled amateurs, has always been very small.

There are, and have been, "wooden-rim" banjos in use on the stage at various times by performers, and although the great majority of this class of banjos may be rated as "tubs," yet a really good instrument of wood rim is sometimes to be found.

And yet, in these banjos, there is almost always to be found metal of some kind, combined with the wood. It may be only an iron or brass strip or wire ring, intended merely to strengthen the rim, but it nevertheless has its effect upon the tone of the instrument.

I can, therefore, confidently assert that the standard banjo, with players of eminence and skill, is a banjo with a metal and wood rim used in combination.

The Stewart Banjos, as manufactured by myself at the present time, are simply claimed to be improvements upon the same style of banjo manufactured by others before me.

On my banjos proper I claim no new invention, nor have I any patents connected therewith. (This remark has no reference to the improved *Banjeaurine*.)

But I do claim an improved and more perfected banjo, secured by new processes of manufacture, some of which remain secrets of my own, and which to attempt to protect by letters patent would merely place part of my knowledge in the hands of others. I also claim a skill in the construction of banjos, the result of a *natural musical gift*, together with a somewhat extended experience as a performer upon the instrument, and a student of the science of music, which, together with experimenting and constant observation, has aided me, and added to my adaptability in this, my particular line of business.

Without any egotistical feelings whatever, I am able to point with pride to the letters from our most talented, prominent and eminent players of the banjo; in fact, foremost artists of the day, testifying to the merits of the banjos manufactured by me, and of their many points of superiority over the instruments of other manufacturers.

I do not assert that the banjos I manufacture are perfect; nor do I believe that those of any other maker are perfect; or that anything produced on this earth is or ever has been *perfect*. But whatever assertions regarding my banjos I have made have been certified to and fully indorsed; in fact, more fully than I have ever asked, by players of eminence who have no pecuniary interest whatever in my business or my banjos.

Neither do I assume to know all there is to be learned about banjo making or any other art, science or philosophy. What I may know to-day I may discover, to-morrow, that I do not know. What seems in place to-day may seem out of place to-morrow, and vice versa.

I expect to learn something new every day, and all that can be expected of me to-day is that I shall give you my views and ideas as they exist at the present time.

I have asserted, and can readily demonstrate by letters from leading players, that the banjo of *German silver and wood combined rim* is and has been for a long time *the banjo*—the recognized banjo of the artist banjo player.

This banjo has a perfectly scientific and philosophical basis of construction, in fact is constructed in as philosophically correct a manner as the guitar, mandoline, zither or any other stringed instrument. Its body consists of a circular frame, called the rim. This rim, as you will notice, has a bright and attractive appearance. It is composed of the alloy known as German silver on the outside, and maple wood on the inside. They are, in fact, two separate and distinct rims so united as to act as one.

We attach to this combination, or rim, a system of brackets, which are so made as to admit of hooks with screw threads cut on them passing through them, and a suitable nut being fitted to each of the several screws.

With these hooks or screws, and by the aid of this bright and neatly-finished band or hoop, we are enabled to adjust the important factor called the head. The head is a membrane or membraneous skin, and is, as shown, adjusted and tightly stretched upon or over the rim or circular frame.

When this is completed we have, as you see before you, the body of the instrument almost complete.

Next, we have the neck of walnut, maple, cherry, rose or other suitable wood, which must be accurately fitted and correctly adjusted to the body of the instrument. We call the upper surface of the neck the *finger-board*, for over this surface the strings are stretched, which are vibrated to produce the musical sounds.

Were it not for this neck surface, the finger-board, we should have only five notes or sounds, as produced by the five strings of the banjo.

This is, of course, speaking only for the regular five-string banjo; some banjos being constructed with additional strings.

The musical strings are stretched from the appendage called the *tail-piece*, which, by the way, was often termed *apron* in days gone by; so termed, I presume, from its large size and close resemblance to the article of female dress designated by that name—over the extreme end of the finger-board, running through notches in this little piece of ivory called the nut, to the pegs, by the turning of which we are enabled to tighten the strings or alter their tension, either one way or the other at pleasure.

The bridge—this insignificant little piece of maple—over which the strings pass, rests firmly upon the head in the position you see in this instrument. Without the bridge the banjo would be useless as a musical instrument.

When the strings are set in vibration, which is done with the fingers of the right hand, the vibrations produce motion in the air, which we term *sound waves*. The sound waves being in close proximity to the head are reverberated by it, and the bridge acting as a conductor of sound, also transmits the vibrations to the head, which is elastic, and these double vibrations, so to speak, are transmitted through the air.

Thus the head acts as a sound-board by which the sound waves caused by the vibration of stretched strings are transmitted, and at the same time is itself a sonorous body, having, so to speak, an independent vibration, and thus plays a double part in the construction o the instrument.

The *rim*, too, plays an all-important part in the vibrating power of the instrument, and is, in fact, the entire foundation upon which the musical quality, quantity and power of the banjo's tone must be built.

The head, as I have shown, is tightly stretched over the rim, and is itseif sonorous, the requisite necessary for producing sound of any kind.

The head having a flat, smooth surface, becomes an excellent sound-board, and being circular in shape, is well calculated to transmit sound waves, which are, so to speak, floating circles.

The head thus tightly drawn over the rim acts in unison therewith. It must act in unison with the rim or we will have a poor banjo.

Thus the head and the rim are united, they are parts of one whole; they must unite and become as ONE just as surely as the pine-wood top of the guitar becomes one with the guitar when it is attached thereto by glue.

The vibration of the strings then, it is conceded, is conducted to the head by means of the bridge, and to the rim by means of the head, and the rim must be so constructed as to respond to and mingle its vibrations with those of the head and strings, forming one harmonious whole.

When the head is wet or damp it is slack, and when in that condition the banjo will not produce a very good tone.

The reason for this is because the sounding quality, or sonorousness of any substance depends upon its hardness and elasticity, and when the head is wet or damp it lacks the necessary hardness, and has not the required elasticity.

Another reason is that when the head is loose and flabby there is not sufficient tension upon the rim to cause it to properly respond to the vibrations of the head, which are much slower than when the head is drawn tight.

What is called a "sharp" tone in the banjo is regulated,

1st. By the tension of the strings, which in all cases regulate its musical pitch.

2d. By the quality, size, tension, elasticity and hardness of the head.

3d. By the size, weight and sonorous qualities of the rim and length of neck. In fact, I might say that

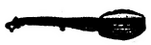
these different points regulate and govern the quality of its tone entirely, be it sharp or flat, musical or unmusical, harmonious or discordant.

The strings which when picked or struck just as they stand, produce each *one* separate tone, but as upon the guitar or violin, we can, by making use of the finger-board, "stop" the strings so as to produce all the notes of the chromatic scale, from C below the staff to C alt.

This is done by placing a given finger of the left hand upon the string, and holding it firmly to the finger-board at the proper position, thus allowing only a portion of the string, instead of the entire string to vibrate. Thus, by making all the stops at the proper positions upon the finger-board, we can cause the strings to produce all the various notes just as readily as though each were produced by a separate string.

Or, we can construct the finger-board with *raised frets*, similar to the guitar, and, as you see in the banjo I introduce, by stopping the string *between* the frets the string is brought down on the fret, and of course vibrates only between the fret at which it is stopped and the bridge, in place of the entire string vibrating as would be the case if the string was allowed to vibrate without being stopped. (Vibrate its whole length.)

It is well here to say a few words in regard to the difference between the tone produced by the banjo and that produced by the guitar, its sister in a musical sense.



RELATIVELY.

The timbre of the banjo's tone is brilliant and enlivening, whilst that of the guitar is more subdued, soft and soothing. When the strings of the guitar are caused to vibrate, their agitation compresses the air body within the instrument, and this air body instantly expands, and aided by the back of the guitar proceeds forth in sound waves.

The top of the guitar is generally constructed of pine or deal, whilst the back is composed of maple or rosewood, as are also the sides. It has a sound hole in the top, circular in shape, from which its vibrations proceed.

The character, quality or power of tone in this instrument depends:

1st. Upon its model or size.

2d. Upon the quality and tension of the strings and the bridge upon which they rest.

3d. Upon the thickness of its top and back.

4th. Upon the sonorous and general acoustical properties of the woods used.

5th. Upon the quantity and specific density of the air body between the back and top (or within the instrument.)

6th. Upon the perfect fitting and adjustment of, and the harmonious action and relation of all its parts, inclusive of blocks and braces within the instrument.

The guitar is best adapted for music of a pensive and soothing character, and at the present day is not in use to any extent as a concert instrument.

Generally, the full power of tone a guitar is capable of producing may be had, by a player in good practice, by picking the strings with the fingers, and any attempt at striking the strings downward with a view to produce a greater quantity or volume of tone, only causes the instrument to give a less melodious and somewhat confused tone.

The guitar is plainly not suited to nor adapted for powerful or "noisy" music. It is a beautiful instrument when played by the hands of a master, whose mind is in harmony with its sphere of action.

"STROKE BANJOS."

In a banjo we sometimes find the tones produced by picking the strings to be acute and brilliant, and yet lacking the power or intensity necessary for a solo instrument; and yet in the same instrument, by striking the strings with a light metal thimble constructed for that purpose, the power and volume of tone becomes augmented to a wonderful extent.

Such banjos are frequently called "stroke" or "thimble" banjos, because they are better adapted for stroke playing or thimble execution than for picking, or playing guitar style.

It is conceded that the strings being vigorously struck, and the vibration being conducted, by means of the bridge, to the head, that the head is caused to vibrate more intensely and vigorously than when the strings are only "picked." Then these vibrations are in a like vigorous manner communicated to the rim, its sounding-frame, which being agitated, mingles with or contributes to the sound.

This is a philosophical fact, provided the banjo is correctly constructed.

THE NECESSARY CONSTITUENTS.

What then are the requisites in a good-toned, or fine-sounding banjo?

1st. An acuteness of sound or tone.

2d. Musical purity of tones and free vibration.

3d. Intensity of tone, resonance, carrying power.

4th. Easy action and equalization of upper and lower register.

In toto: The banjo must have a *musical tone*, and at the same time, not relinquish its "banjo" characteristics or individuality, and there must also be sufficient *resonance* of sound.

What then is necessary in the construction of a good banjo; and how must a banjo be constructed so as to meet the requirements of an artist? I think I hear some one say, "It must be made perfect, or as nearly so as possible, in all its parts and the parts must all be fitted correctly."

This is very good, and true so far as it goes. I hear another answer, "It must have a good head on."

Excellent! true again, but why not add, "a good set of strings," for we could make no music without them.

Let me ask you, where can you find an instrument, tool, engine or a machine of any kind whatsoever, which is satisfactory in any way or capable of doing good work unless it is properly constructed, adjusted and correctly fitted in all its parts?

And yet, it is possible to construct a machine which is correctly made, adjusted and properly fitted in all its parts, and yet produce a machine which is incapable of doing the work it is intended for. The model may have been all wrong. The inventor may have in his mind, when he conceived his idea, been wrong or mistaken in his calculations as to the compass and capability of his machine.

In this case a perfect making of the various parts together with correct fitting of the same, has not produced the result aimed at, simply because the entire foundation of the work was wrong. Just so it may be with a banjo.

What then is necessary?

1st. The head should be of even thickness, neither too thin nor too thick.

2d. The strings must be of the right kind and quality.

3d. The wood in the inner rim must be selected with a view to sonorousness or acoustical qualities. It should be properly seasoned and correctly treated and shaped.

4th. The German silver or other sheet metal for outer rim should be of the right temper, uniform thickness and density, and properly rolled. It must also be perfectly and evenly brazed.

5th. The neck should be of wood selected with a view to lightness, strength, sonorousness and nonliability to warp or change with atmospheric changes.

6th. The "wire edge" must be so constructed as to act as a ready conductor of sound, and at the same time resist the strain of the head upon the rim. This "wire edge" ring must be of the right thickness, proper specific density, uniform in thickness, and composed of a suitable metal. It must also be accurately adjusted in making the rim.

7th. The wood rim, sheet metal rim and wire edges must all be constructed upon acoustical and scientific principles, and must likewise be united as a whole upon a philosophical basis.

8th. The neck must be properly fitted to the rim and adjusted to suit the tension of the strings.

9th. The neck should be so veneered as to withstand climatic changes as much as possible, and to resist the strain of constant changes in pitch of the strings.

10th. The wire ring called "flesh hoop," around which the head is wrapped, should be so constructed as to securely hold the head from slipping, and the band or hoop whose place it is to draw the head tight and secure it in position, should be so constructed as to hold the head evenly all around the circle, and not permit the ends of the hooks to press against or cut the head.

11th. The bridge must be of the right heighth, width and thickness, and constructed of wood having the necessary acoustical properties.

12th. If the banjo finger-board is fretted, the frets must be so gauged that the bridge has its proper position upon the head.

All the parts of the instrument must, of course, be harmoniously blended and correctly joined and fitted.

All of these points, merely outlined here, should be studied by the true banjo maker. And there still remain many others to be considered, such as varnishing, polishing, glueing, etc., etc. The weight and number of brackets is also a very important point.

* * * * * * *

In the making of cheap grade banjos, such as are now largely found in music shops and pawnbrokers' establishments, very few of these points need be considered, if indeed, any of them are considered at all by wholesale manufacturers.

But as cheap grade banjos, like "trade fiddles," are not intended for *artists*, it is of little signification to us how they are constructed, and I will therefore pass but a few remarks concerning their manufacture.

"Trade Banjos" and "Store Tubs."

It sounds rather homely to designate a gaudy banjo having a cart load of brackets (more or less), a "Store Tub," and yet they are often designated by such an appellation. Nick-names are wont to stick when they once take hold. The time is coming when a large number of brackets upon a banjo will cause it to be looked upon with suspicion. At the present time the commonest banjos made are covered with brackets in order to catch the eye of the passer by.

One has only to walk a short distance to come across a store window where this class of banjo is displayed.

In the factories where these instruments are manufactured the work is done almost entirely by steam-power machinery, whilst in the higher grade of banjos only a portion of the work can be done in this way.

Cheap necks are made in large quantities, by special machines, in a manner somewhat similar to which gun-stocks and ax-handles are turned out.

They are veneered, if veneered at all, with a single strip, as no machine has been devised for glueing on veneers. These necks are sand-papered on "buffs," run also upon steam lathes.

The wooden rims are glued up to as uniform a size as possible, after which they are "turned up" on lathes and sand-papered at the same time.

This work, to insure cheapness, must be done in large quantities, or a large number manufactured at one time.

The metal part of the rim in cheap banjos is generally made of sheet brass, nickel-plated.

The sheet metal is cut to a gauge in strips of uniform size, brazed together, formed up, spun and nickel plated; after which the already-made wooden rim is fitted into it.

If the cheap rim is to be "wired" on both edges, one edge is generally left until after the wood is in.

The wire edges in these banjos are placed there in order to give the instrument a finish, and to strengthen the rim.

The cheap necks are generally set in the rims, that is, the holes cut in the rims either with a cold chisel or punch made for the purpose, by boys; anything to facilitate the work.

The holes for brackets are bored with a drill, the lathe of which runs by steam, and the brackets and heads are put on and the hoops fitted, mostly by boys.

Different shops and different mechanics employ various methods. I am only generalizing here.

The banjos are strung up and sold, and I doubt if the majority of them are tested or tried, or if bridges are ever fitted to them before they leave the factories.

Cheap banjos are largely sold to the stores through wholesale jobbing houses, who import and wholesale musical goods, and have drummers or selling agents constantly on the road with samples.

They are sold, generally, by the dozen, at so much per dozen, half dozen, or quarter dozen, and regardless of age, sex, color or previous condition.

You may get a good one—you may get a poor one. The purchaser must take his chances as to that. Nearly every learner of the banjo has to make his experience, and must needs buy one or more "store tubs" before he is fully prepared to purchase a good instrument. The same rule applies to beginners with all other instruments. It is the same with the guitar, with the violin, with the zither, with the flute, with band instruments, and in fact with all musical instruments.

If this were not the case good instruments would not be appreciated. Wholesale manufacturers of cheap instruments cater to the eye first—the ear afterwards.

They know that nearly all beginners will buy a cheap instrument to learn on, and that a large proportion of those who buy cheap banjos or other instruments will never make anything but mediocre players, and will not know the difference between a good or poor instrument, so long as they have the same appearance in outer respects.

Then, too, the prices of cheap instruments suit the pockets of the majority better than expensive instruments.

These facts account for the enormous number of cheap banjos manufactured and sold in this country, as well as for the large number of cheap guitars imported and placed upon the American market.

But in the manufacture of a high grade banjo the work cannot be greatly cheapened by the employment of steam-power machinery; nor can it in the manufacture of a high grade guitar or violin.

In the higher priced banjos there is a certain amount of testing to be done at each step of the way, and the banjos cannot be made up in quantities with success. Each instrument requires separate consideration. Steam-power machinery can be utilized in the rough work, such as band sawing, shaping out, etc.; also in metal spinning, turning, etc. But much of the work must be done by hand, nevertheless.

The necks in fine banjos are sawed out, shaped, veneered, etc., many months before they find their way into the instrument they are intended for. Were not this the case we should be troubled continually by necks warping, and even with long seasoning of wood, etc., we often find that a neck will warp after it is ready for finishing.

Sometimes the addition of a single veneer will cause a neck to warp, and it has taken me a long time, and cost considerable money to arrive at the proper methods of making and treating necks. I have not the time to speak upon this part of the subject at length, but merely to touch upon it briefly. The subject of banjo necks alone would require a complete lecture were I to attempt to dwell upon it to any length.

As I have already stated, there are many points of detail in connection with banjo making which I am not prepared to touch upon at all, for the present, they being held as secrets of my business. And even were I disposed to enter into details it would require a book of at least 500 pages to cover the ground, and moreover, I am continually making new discoveries and consequently improvements.

Sufficient to say that very frequently after a banjo is entirely finished it must needs be taken apart and the work "done over again." This is the case when plenty of time is allowed for the making of a fine instrument, and when upon its being finished I have not found the tone entirely satisfactory.

It is sometimes the case that a well made and properly constructed banjo may sound poorly by reason of its having upon it a poor head, or a head not adapted to the instrument. In this case, when the head is removed and replaced by one which is the proper thing, the banjo will be found greatly improved in tone.

But if the banjo has upon it a good, even head, properly stretched, and does not sound well, there is small chance for improvement by changing heads. Not more than one change is recommended in any such instance.

You may have heard it said that any poor sounding banjo could be made to sound well by changing the head, but I tell you that an improperly constructed banjo cannot be made into a good instrument by changing the head. Experience has taught me that this is a fact. My musical knowledge and the study of acoustics also teaches me that any such idea is an utter fallacy.

Banjo making, in fact all musical instrument making, like the science of music so called, is a science only to a certain extent. It is an art, an art based upon scientific principles.

A man cannot make a good musician, never mind how much science he may have in him, unless he is an *artist*. The same rule applies to musical instrument making.

I have heard it said that a violin could be improved by breaking it up and glueing it together again. I have heard it said that a banjo could be improved by baking the rim in an oven. I have heard a great many other funny things and so have you. I don't believe all I hear, neither do you. Perhaps if you should take a good guitar or violin to some excellent mechanic (worker in woods), who had no acquaintance with music or musical instruments, and ask him if he could make you a duplicate of either instrument, he might answer "yes."

He would probably reason that all he had to do would be to follow the original as a model, gauge and measure, using precisely the same kinds of wood and varnish, and having produced an exact copy of the original the tone must necessarily be the same. But you all know that the chances are ninety-nine out of a hundred that his copy would not sound anything like his model.

Why is it?

Why do not copies of the famous Cremona violins sound equally as well as the Cremonas?

"Perhaps they do," you answer.

Well, thousands of eminent artists in violin playing assert that they *do not*, and very few assert that they *do*. So why is it?

Science has never been able to demonstrate clearly as to why it is.

Some say that it is *age* alone which gives the Cremona violin its superior tone. Some say that it is owing to the peculiar qualities of the woods then used. Others say it is owing to the long use of the instruments.

Some seem to think that it is the rosin dust, which in course of time has an action on the wood. And we have many fine spun theories—some of them exceedingly fallacious and supremely ridiculous.

Volumes have been written and published upon this subject, and many there are who consider violin making a lost art.

I believe that the ancient Italian masters worked upon perfectly scientific principles. They concentrated the entire powers of their minds upon their work, and worked slowly and with harmonious surroundings. They understood the different specific qualities of their maple and pine woods. The climate of their country was adapted to the growth and seasoning of the woods used. I also believe that they were guided in their work by the same inspiration which guided the Italian painters of the same age. The Cremona masters were *true men*—they followed their minds' ideal and did not copy the forms designed by others.

Such of these old violins as have had the good fortune to escape the hands of some of our modern repairers I believe are good yet, but there are few of them in existence.

I do not believe that age alone ever made a good violin out of a poor one, but I believe that age, together with proper care and the use of the instrument by a good musician, will improve, rather than injure, a good violin.

I do not believe that age can act upon the wood, after it has been once thoroughly seasoned (as all the woods used in these violins were) in a manner to cause the tone to improve. But I believe that vibration exerts a powerful influence upon wood and other substances. The full powers, uses and abuses of vibratory motion have not yet become known.

An instrument may become greatly improved in tone when played upon for a long time by a skillful performer, and the same instrument may become greatly impaired in tone by the discordant and unharmonious raspings of a musical botch.

The chief beauty in the old violins lies in their beautiful sweet tone and its carrying power. Not that the tone is loud, but that it can be heard a good distance, and is free from discordant elements.

A loud instrument is sometimes found to lack this power, and cannot be heard so far away as the softer toned instrument.

The philosophy of this is that pure sound will carry further than sound mixed with noise or discordant elements.

EXPERIMENTS.

There have been some very interesting experiments made with old violins, as perhaps some of you have read.

Fetis, a distinguished writer upon the violin, says that a piece of figured maple wood of certain dimensions taken from the back of a violin made by Stradivarius, in the year 1717, produced the note A sharp, and another piece of plain maple from another instrument of the same maker, made in 1708—nine years previously—produced the same note.

He also says that a piece of deal or pine taken from the top of a violin of Stradivarius, made in the year 1724, produced the note F, and that another rod of deal from an instrument of the same master, made in 1690, gave also F, the same as from the violin made in 1724; and a third rod of deal obtained from another instrument of this celebrated maker, made in 1730, also gave the same note, F.

I have in my possession a very fine copy of a Stradivarius violin, a copy of the year 1717, but the scope of this lecture will not permit me to dwell further upon the subject of violins, the few words I have said being merely illustrations of other remarks I shall make concerning banjos.

SONOROUSNESS.

All woods, being to a greater or less degree hard and elastic, have the requisites for producing sound.

All *woods* yield some sound; all *metals* do not.

The specific sonorousness of wood was known to the ancient violin makers, it is known to day.

Maple and pine woods were used by the Cremona masters in their violins almost exclusively. The maple is often called *sycamore* in Europe, which has led students to suppose that the backs of violins were sometimes made of the wood of the Egyptian or Syrian fig tree. I prefer maple to-day, to any other wood for banjo rims. I have sometimes combined it with pine, but I consider the maple as indispensable. But this is saying almost nothing, for maple wood is of so many kinds and qualities that it takes time to study and learn how to distinguish its peculiar characteristics.

It has been demonstrated by experiments made on various woods whose appearance was the same, that they yield diversities of sound. They vary greatly in pitch, sometimes a third, a fourth, or even more. Hence, should we select two pieces of wood, the same in appearance, with which to make the backs of two violins, guitars or zithers, or the rims of two banjos, they (the woods) might possibly be widely different in pitch as well as in character of tone. Science cannot fully account for this, but experiment proves it to be a fact.

Coals of the same chemical composition, it is said, do not always give out the same amount of heat. This fact has puzzled chemists for a long time.

Now if chemists are puzzled, and have been puzzled for a long time as to why it is that coals of the same chemical composition give out various degrees of heat, it is fair to suppose that they might puzzle for a still longer period without finding out why it is that woods of the same appearance, size and weight, give various degrees of sound.

WOODS.

Maple, Oak, Walnut, Cherry, Apple, Pear, Rose and some other woods, each possess acoustical properties when properly selected and used in the right place.

All of these woods may be used in making banjo rims, but in the long run I think maple gives the best satisfaction, although, of course, maple in itself may vary to a great degree in its sonorous qualities.

Two violins may be made from the same blocks of maple and pine, and yet be entirely unlike in musical qualities—one may be excellent and the other very poor. Such has been found to be the case frequently.

If we take a metal bar or rod and cut it in two, both parts being the same, each part will sound the same note, which will be an octave higher in pitch than the whole bar sounded before it was cut in two. This is, of course, provided the bar is of equal thickness and weight throughout.

If we take a musical string and divide it in two by stopping it midway between its vibrating points, or on a banjo, between the nut and the bridge, half the string will sound the octave above the open or whole string. This is providing the string is of equal thickness throughout.

If we take two bars of wood, one bar half the length of the other, and each of the same thickness, the short bar will sound an octave above the long bar—*but not always.*

In a string, a very slight variance in thickness, so slight as scarcely to appear to the senses of touch or sight, and so slight as to escape the test of the string gauge, will cause it to sound "false," or not to vibrate in accordance with mathematical laws.

So it is with the bar of wood. A difference in the density or weight of two pieces of precisely the same size will often cause them to vary greatly in the pitch of sound produced, as well as in acoustical quality of tone. This is sometimes a difficulty encountered in the making of xylophones, and another well known fact is that a xylophone frequently goes out of tune after being made and tuned.

Chemical changes in the woods used, through processes of nature, changes of climate and other causes, operate to produce this. Hence it is that woods used in the construction of musical instruments must be thoroughly and properly seasoned, and philosophically treated in working.

To say that a piece of wood is extremely sonorous simply because it is maple, would be foolish, because all maple is not equally sonorous. There is an immense difference in it as there is in other woods. Take rosewood, for instance, a beautiful wood for veneering purposes. It comes from Brazil and other countries where the climate is warm, and is the product of several different kinds of trees. I might select a number of strips of this wood and each piece have an entirely different appearance, and yet it all goes by the same name.

Then take ebony, the wood used for finger-boards of banjos, violins, guitars, etc. It is so used because of its hardness and tendency to withstand wear, but it is a cracky wood, and must be treated and worked by those who understand it. It grows on the islands of Madagascar and Ceylon, and does not like our variable climate any better than some other close grained woods which grow in warm climates.

It is a mistaken idea with some of you that ebony is always black in color. Black is its usual color, but I have seen some that was red and other that was green. I have seen more which was black in some places, and of a light color in other places. Indeed, this is considered the best for finger-boards, not being so liable to crack. The light places may be stained so that the entire surface appears as black as may be desired. But I have not the time to go into minor details in this lecture, and I fear that I am wandering from the subject in hand.

German silver is an alloy composed of copper, nickel and zinc in various proportions, according to what it is intended to be used for. It may be hard or soft. If too hard it can be made softer by annealing. If too soft it may be made harder.

To say simply that German silver is a good metal for banjo rims is almost saying nothing at all, for so much depends upon its composition, its thickness, its temper, and the manner in which it is worked, as well as in the manner in which it is combined with other metals and woods used in the construction of an instrument.

It takes a fine polish, which is pleasing to the eye, and furthermore, may be nickel-plated, so as to retain its high finish for years.

German silver is sometimes called white copper, and sometimes called argentan, but I have always held to the name by which it is mostly known, although it might sound very nice to say that my banjo had an argentan rim or white copper hoop.

To say that a banjo has a bell-rim or a bell-metal rim, sounds nice to some persons, but the experienced performer wants whatever bell there may be in either the rim or in the metal to manifest itself through the medium of the strings when he plays upon the instrument.

If the banjo will not thus work it matters little whether the rim be composed of bell-metal, German silver, brass, copper, rosewood, maple or railroad iron.

The names of the various materials which enter into its construction count for little if the instrument has not the tone desired by the performer.

BELL-METAL is an alloy of copper and tin. It is very hard, and consequently the metal workers do not like to work with it. Therefore if I should make a banjo rim of this metal it would have to be cast instead of being rolled and spun on lathes.

I do not consider it any better than brass or German silver to use in a banjo rim, if as good as either.

Now suppose I should take a bell—bells are supposed to be made of bell-metal—and suspend or fasten it within the banjo rim, or even hang it up anywhere near the banjo, so that the vibrations coming from the instrument would come in contact with the bell.

I now strike a chord upon the banjo, and then another, and so on.

I keep on striking chords until I have struck the one which is in harmony with the bell.

Now the vibrations from the banjo have caused the bell to give forth a sound which mingles with the tone of the banjo.

You will perceive that the bell does not sound or add to the sound produced by the banjo excepting when this chord is struck—this chord which is in harmony with the bell.

If two strings are tuned perfectly to the same pitch, and one is set in vibration, the other will respond and add its vibration to the other. The one is in accord with the other—both producing, when vibrated, the same number of vibrations per second.

This will apply to all sounding bodies. The zither table for increasing the volume of sound from that instrument is constructed upon the same principle.

Now, if we desire to have the bell respond to each note made by the banjo, or to add to the tone produced by that instrument, it will be necessary to have a bell for each chord, as you will say, an impossibility.

Therefore, a bell in the rim of a banjo is like the fifth wheel to a coach—nearly always a useless incumbrance.

Such incumbrances are, in fact, not used by players who have made any degree of progress in the art of banjo playing.

Again, suppose I were to construct a rim of bell-metal or brass, something in the form of a bell, so that when suspended from a cord and struck, it would produce a bell-like tone, Do you imagine that this would add to the musical value or to the volume of sound produced by the banjo when its sirings were struck?

It would do so only when the notes or chords, in unison or in harmony with the bell-shaped rim were used, whilst upon all the other notes or chords it would act as a damper and lessen the tone.

This is a philosophical fact and has been proven by experiment.

What kind of a bell (?) then, must the rim consist of in a good banjo, in order to produce a musical tone in all the notes and chords throughout the compass of the instrument?

1st. It must be a bell that is silent, except when you want it to speak.

2d. It must be a bell that, when it speaks, will sound equally well in all the tones of the instrument.

3d. It must be such a bell as will only ring when the strings are made to vibrate, and it must cause its presence to be known only through the medium of the vibrating strings, and never sound independent of them.

In short, *a rim which is a dumb-bell—mute in itself, but sonorous when manifested through the strings of the banjo.*

When you have learned to make such a rim you have acquired the first principles of making a good banjo.

The body of a Cremona violin is just such a bell as I have described, and yet the tone pitch of its top and back have been shown *not to have been tuned in unison.*

The musician knows that the chord of the *diminished seventh* when heard alone is discordant and disagreeable to the ear, but when used in its right place, and blended with or between concords, becomes harmonious and pleasing to the ear.

When I hear of banjo makers attempting to do away with all combinations of wood and metal in order to produce a musical tone, I cannot help thinking of the fable of the fox, who, having lost his tail by reason of having been caught by it in a steel trap, in order to avoid the ridicule his appearance would create, hit upon the scheme of persuading all the foxes in his locality to cut off their tails and become like himself. It was impossible for this particular fox to retail himself, and so he wanted all the others to lose their tails also. Misery, it is said, loves company. "Grapes are sour to those who cannot get them."

Those who are not familiar with banjo making or its principles sometimes give vent to rather absurd ideas, and afflict the public with curious banjos. And those who cannot grasp an idea or evolve a principle sometimes seek to persuade themselves and customers that they are better off without what they cannot obtain.

Before I go any further I wish to say that I have no desire to "hit at" or criticise the methods pursued by other banjo manufacturers, nor to in any way speak derogatory of their work or business. It is my desire, as far as conditions and circumstances will permit, to live in harmony with my fellow man, and when I mention forms of instruments manufactured by others in my line of business, I speak of them only in a general and illustrative manner, and mean nothing personal.

I have arrived at that point where I can look with pity upon a manufacturer, who, in his struggles to gain patronage, will resort to bogus challenges and "Champion of the World" methods and advertisements flaunting with unattested assertions. Vaunting his ignorance before a class of patrons even more ignorant than himself, and puffing himself as the patentee, inventor or claimant of inventions made before he had the misfortune io inflict the banjo fraternity with his presence.

I also look with pity upon the manufacturer who asserts and is psychologised by his ignorance into believing that he has made the banjo a perfect instrument, or has added more improvements to it than all others combined, and that all other manufacturers are his imitators.

On the other hand I am at all times ready to extend the hand of friendship to all sincere and honest makers or teachers of the banjo.

I am aware that various reports have been circulated concerning myself and methods of treating certain individuals, but the censure of some persons is almost, if not quite as valuable as the praise of others.

And again, if any of you were dealing with a skunk, you would not handle him in the same manner that you would use an animal of less odorous propensities. No, you would either get out of his way and let him alone, or else you would give him a dose of something more intensely clarifying than he was able to produce. But enough of this.

MUSIC BY THE FOOT.

Many of you have heard the expression, used in connection with organs mostly,—"sixteen feet tone," "eight feet tone," etc., and probably few of you understand what is meant by such seemingly peculiar language.

An organ pipe eight feet long gives the great C, the lowest note and normal tone of the organ. A pipe half as long sounds the octave above, having double the number of vibrations per second. Whilst a pipe two feet in length vibrates four times as fast, and consequently sounds the next octave above, or two octaves higher than the first mentioned, and a pipe sixteen feet in length vibrates only half as fast as the pipe eight feet long and sounds an octave deeper.

The expression "feet" of tone is derived from this basis.

Any instrument which sounds its tone an octave lower than written in the music, is said to be an instrument of sixteen (16) feet tone.

An instrument which sounds its tones as written, is called an instrument of eight (8) feet tone, whilst an instrument which sounds an octave higher than its tones are written is called an instrument of four (4) feet tone.

The guitar sounds really in the bass cleff, but for convenience sake is noted in the treble cleff an octave higher than its tones sound, and hence is an instrument of sixteen (16) feet tone.

The violin sounds as written, and is therefore called an instrument of eight feet tone.

The banjo, originally, was an instrument like the guitar, of sixteen feet tone.

DIVISIONS OF THE SCALE.

If we take a bar of iron and cut it in two, either half will sound an octave above the whole.

(It is presupposed that the bar is of even thickness and density throughout.)

I will say, for instance, that the bar sounds the note C, in its full length. Now, I have a number of such bars, or rods, all of the same length, thickness and weight, and I wish to construct from them the notes of the diatonic scale in C major. I proceed to cut them up in the following manner:

For C I have the whole bar.

For the next note, D, I cut off one-ninth, leaving eight-ninths.

For E I cut off one-fifth, leaving four-fifths.

For F I cut off one-quarter, leaving three-quarters.

For G I cut off one-third, leaving two-thirds.

For A I cut off two-fifths, leaving three-fifths.

For B I cut off seven-fifteenths, leaving eight-fifteenths.

And for the remaining note, C, an octave higher than the first, I cut a bar in half, using either half.

If the bars are, as I have said, perfectly even and equal in thickness throughout, and I have cut them accurately, I have the eight tones, or the seven different sounds, and the octave of the first, quite accurate.

The same will apply to any bar of metal treated in a similar manner, and the same law governs the divisions of musical strings in laying out a fret board for any instrument.

But, as I have said before, if a string is "false," which is often the case, the law of divisions is set at defiance.

The higher a note is, the greater the number of vibrations produced.

When vibrations are measured, they are counted at so many vibrations in a second of time. This is done for convenience sake.

A note having twice the number of vibrations produced by another note sounds an octave higher in pitch.

The middle C, years ago, was the note which produced 256 vibrations per second. Now, the middle C, is said to produce about 260 vibrations per second, the standard of pitch having been raised somewhat.

An instrument called a sonometer has been devised for testing and measuring the sounds or tones produced by stretched strings.

It is a very simple affair, consisting of a string stretched over a box, to which weights are attached, with a movable bridge.

The laws governing stretched strings have been ascertained and tested by experimenters in acoustics by means of this sonometer (meaning sound measure).

The rate of vibration of a string is always in *inverse* proportion to its length. That is, as I have stated, a string when vibrated in half its length will sound an octave above the string when vibrated in its whole length; as half the string will produce twice as many vibrations per second as the whole string. By vibrating a third or a fourth of the string the vibrations become three and four times as fast—*providing the tension is the same.*

Sometimes, when the string is stopped upon a fret, if the string lies any considerable distance from the board, there is a slight change in tension which causes a somewhat sharp or false note.

A string twice as thick as another will vibrate only half as fast, and consequently sounds an octave lower. This is providing the tension of the two strings is the same. The rate of vibration (so many vibrations per second) is in *inverse* proportion to the strings' thickness. But the strings compared must be of equal density, of course.

Should I replace gut strings upon any instrument, by strings of wire I should use much thinner strings than those of gut; otherwise the change in tension and consequent strain upon the instrument would be enormous.

The rate of a string's vibration is in *inverse* proportion to the square root of the density of the string.

Thus, a gut and a wire string, each the same in length and thickness, and strained to the same tension, will produce entirely different notes. If the wire string is sixteen times as dense as the gut string, the gut string will vibrate four times as fast as the wire string, and the notes produced will sound two octaves above it (four being the square root of sixteen). I have referred to these matters before; you will find them mentioned in my little ten-cent book, "Sketches of Noted Banjo Players," but I cannot allow them to pass here, without making the lecture incomplete.

FRETS.

It is said that the violin was delayed in its advent for a period of a hundred and fifty years, by frets. The viol, which preceded the violin, was an instrument of *raised frets*—on the same principle in which fretted instruments are made to-day. It was the removal of these frets which led to the developing of the violin and its powers.

Owing to this fact some writers on music have thought that the guitar would have done better without the frets also. But I think guitar playing, making chords and barres, on a smooth board, would discourage ninety-nine persons in a hundred from getting further than the first three or four lessons. Playing a guitar without frets is something which is "easier said than done."

I have discussed the subject of fretted banjos at various times in the columns of my *Banjo and Guitar Journal*, and do not wish to go into it at any length here. It has its advantages and it has its disadvantages.

I consider a smooth board by far the most musical, but it requires long and arduous practice to acquire the mastery of.

In short-necked, banjos, such as the *Little Wonder*, and in all "piccolo" banjos, I consider a fretted board preferable; and I might say the same for the *Banjeaurine*, which I manufacture exclusively with the (raised) frets.

It is an important matter for the student to know that if he begins the study and practice of the banjo with a fretted board (when I say "fretted" I mean raised frets, of course), it will be exceedingly difficult for him to acquire a correct intonation afterwards if he should desire to perform upon the smooth unfretted finger-board.

The reason of this is because with frets (raised) the string is pressed to the board between the frets which causes the string to be stopped upon the fret, and hence an inaccurate and somewhat careless manner of fingering is acquired.

But I fully realize that many pupils would never learn to play upon an unfretted banjo, and I am therefore unwilling to advise all persons to attempt such a task.

Those who intend to practice and play "only a little," would probably do better with frets; but he who intends to devote time to practice and the mastery of the banjo finger-board, should make up his mind to do without such mechanical helps.

MATHEMATICAL DIVISIONS.

Lord Bacon said: "If a man's wits be wandering, let him study arithmetic," and mathematics, which embraces this study, is probably the only exact science in existence.

Mathematics is inseparable from all other sciences. The physician makes use of it in writing his prescription. The druggist in compounding medicines. The artisan in measuring distances, and the musician in forming his musical bars must measure the notes. Hence, all other sciences are closely allied to and intermingled with this science, and music is in itself an art with a scientific mathematical basis.

THE CIRCLE AND TRIANGLE

are the emblems of Creation, and the symbols of our mathematical science.

The earth makes its yearly circle around its centre, the sun, and all nature tends to roundness, circles and spiral circles.

Rays of light diverge from the sun and converge towards it, the centre, again forming, as it were, the lines of the triangle.

Every musical accord between two notes is defined, and can be expressed *by the arithmetical vibration ratio of two whole numbers.*

By *ratio* is meant the relation which one quantity or magnitude has to another of the same kind.

As has been said, the number of vibrations made by a string or other sounding body can be *measured*, and by determining the relation that exists between the *rate of vibration* and the *heighth of a note*, a mathematical scale for dividing off the frets of an instrument can be made.

It is upon this basis that rules for measuring off guitar and banjo fret-boards have been made.

The rule of consecutive eighteenths is most in use and gives very good results.

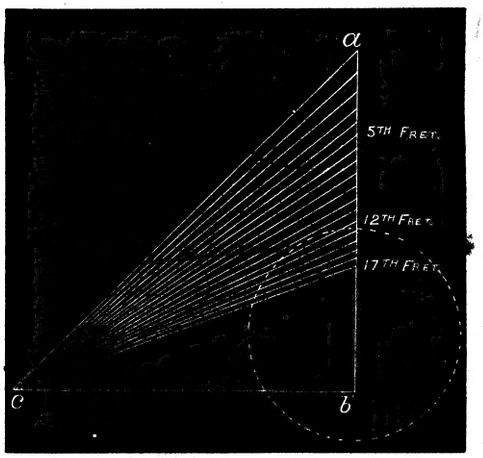
The divisions may be made by ordinary arithmetical calculation, always taking care to prove each division by a multiplication before proceeding with the next. A gauge graded to fiftieths and one hundredths of an inch is very useful here, and can be purchased wherever surveyors' or mathematical instruments are sold.

The divisions may also be made by geometrical progression, but it makes little difference how they are made, so long as they prove correct.

All the various rules laid down for fretting banjos, so far as I have seen, hinge entirely upon the various manners of making the divisions of successive eighteenths, and assume that after you have divided the eighteenths correctly, that you will have an absolutely correct scale of semitones.

But this is a fallacy.

The eighteen is as near as we can get to a number with which to start, but there is nothing to prove that it is absolutely correct.



THIS CHART (from which the accompanying wood cut is a condensed copy) shows a banjo fretting scale divided and set to the triangle.

It will be seen that if we make a correct scale for the longest banjo in use, and it is perfectly adjusted to the triangle, it can be used to fret necks of any desired length.

I first made this chart about seven years ago. I do not claim anything original about it, nor have I ever made any use of it in fretting my banjos.

A is the *nut* line, and a point of the right-angled triangle.

B is the *bridge*-line, and corner of the triangle.

C is the remaining point.

The fret divisions must all converge, or run directly to the one point.

By slipping the triangle to the right we can, as has been said, fret any shorter neck therefrom.

However as there is considerable danger of making mistakes in this way, I advise no one to make use of it.

I give it simply to convey the idea.

Even with a perfectly accurate fret-board a banjo or guitar is often false in many of its notes, simply because strings, which are absolutely true, are scarcely ever to be had.

This is one of the principal objections to raised frets on a long-neck banjo.

A violin virtuoso cuts his string into three pieces, and is generally sure of getting at least one length, which is true; but a banjo artist cannot so cut his strings if he has a banjo of the usual size and proportions.

THE BANJEAURINE.

This "somewhat different from the ordinary" name is given to this somewhat peculiar-looking instrument. The banjeaurine is a device of my own. It was gotten up as an instrument to be used in connection with the ordinary eleven or twelve-inch banjo; the banjo to play an accompaniment to the melody played upon the banjeaurine.

You will notice that the neck is shorter in length than the diameter of the rim, and that the finger-board of ebony extends over the rim, somewhat similar to that of a guitar or violin. This necessitates the use of a higher bridge than is used on other banjos, and this in itself is a great help to the performer who desires to produce a full, loud tone, and consequently must "pick" the strings vigorously.

On a low bridge, there being but slight pressure of the strings to resist the upward or side pull by the fingers, the bridge constantly slips out of place—that is with players of brilliant execution—but with a high bridge, such as can be used upon the banjeaurine, the increased pressure of the strings holds it in position.

Were the instrument intended for "stroke" or thimble playing, the high bridge would not answer so well; but the banjeaurine is not intended or recommended for anything but "guitar style," or picking.

When the instrument was first introduced there was some trouble with the finger-board and neck, and to entirely obviate this I devised the nickel-plated attachment which you see running from the heel of the neck to the end of rim.

This serves as a fastener to the neck, a brace, and also a perfect adjuster of the finger-board.

By turning the screw under the tail-piece nut, the finger-board can be raised or lowered, and to prevent any weakness in the neck a wooden plug is glued into the heel, running directly across the grain and making the neck very strong.

The appearance of the banjeaurine is not calculated to attract a banjo player who has been accustomed to believe that a banjo cannot be good without a neck much longer than the diameter of the rim; but when he has heard it played then he is attracted to it on account of its tone.

It used to be thought that a banjo could not have a full vibration unless the neck was long, and that short neck banjos were not good; but the banjeaurine, although constructed contrary to all previous ideas regarding the instrument, has completely demolished the old theory and, as well, astonished many players of tho banjo.

It is much easier to finger than a long neck banjo, because the frets are closer to each other.

It is not so unhandy to transport or carry around.

It breaks less strings, and is less subject to the annoyances of false strings than a long neck banjo.

It is louder and more brilliant in tone than any other banjo used for "guitar style" of playing, and makes a beautiful combination with the ordinary banjo, and is also a splendid solo banjo to play with piano accompaniment.

The banjeaurine is tuned a fourth higher in pitch than an ordinary parlor or concert banjo, and consequently, when the banjeaurine is played in the key noted as E, the other banjo plays in the key noted as A. That is the 3d string of the banjeaurine is tuned in unison with the 2d string when stopped at the first fret—or, an octave higher than the bass string open, on the ordinary banjo.

To make it still more simple, I have only to say that when you play in the "open key" on the banjeaurine, the other banjo plays the accompaniment in the "closed key." This explanation is for "ear players."

At the time of introducing the banjeaurine I had not thought of applying for patents in connection with the instrument, but upon being apprised by certain artists who were using the instruments that other makers were preparing to copy the banjeaurine in detail, I then filed my application in the patent office.

I suppose it will not be long before I shall hear of other "original inventors" of my banjeaurine; a thing which has happened in connection with some other devices of my own.

Mr. Huntley, the eminent banjo artist, who has traveled extensively here and in Europe, and who has had many years' experience with banjos, assures me that never has he seen, at any time or in any place, an instrument like the banjeaurine, either in appearance or tone.

Mr. Lee, another eminent player and writer for the banjo, assures me likewise.

I merely mention these little matters in order to place the origination of the banjeaurine upon record; I don't desire to push the sale of the instrument in place of my legitimate or regular style standard banjos.

THE CARE OF THE BANJO.

It is necessary to say a few words concerning the proper care of a banjo, as I have found that many players pay but little attention to keeping their instruments in good playing condition.

No machine or instrument ever devised will do good work unless it is kept in proper working condition.

There are some persons who can carry a watch for years and always have it keep good time; others again are never able to rely upon their watches, and often go so far as to expect them to denote the correct time without being wound up.

Briefly, then, I would say that the head of the banjo should always be kept tight, but never held before the fire for the purpose of contracting its fibres. Avoid exposing the instrument to extremes of heat and cold. Avoid keeping the banjo in a damp place; the more even the temperature where the instrument is kept and used, the better its condition.

Always keep an assortment of suitable strings ready for use, and see that your instrument is strung with those of a proper thickness, and properly graded as to size.

The second string should always be a little thicker than the first string; but the fifth, or short string, should be the same thickness as the first.

The bass, or wound string—also called the fourth—should be wound on silk; never upon wire.

The strings should never be slackened after using the instrument; but it is sometimes better to remove or let down the bridge, especially if you are carrying the instrument from place to place.

When the bridge is about to be let down, the first and fifth (or the two outer) strings should be removed from their places in the notches; this will prevent splitting or chipping of the edges of the bridge.

Notches in the bridge should be so cut that the strings wedge in them tight. Then, should the bridge slip out of place when playing, a little powdered rosin may be rubbed upon its feet. The bridge should be regulated in height to each particular banjo; as well as in thickness; and in width to the fingers and tastes of the performer.

The finger-board, strings and neck should be carefully wiped with a silk handkerchief after using the instrument, and a player should never allow an inexperienced person to handle his banjo or to finger the polished surface of the rim and leave finger-marks.

The tail-piece may be fastened with a bolt, with an annealed wire (phosphor bronze wire is the most durable), or with a suitable gut string. It will make no difference in the tone of the instrument how the tail-piece is secured to it, providing it is allowed a certain amount of swing, and does not press upon the head further than at the edge of the rim.

Those who seek to improve the banjo's tone by substituting a gut string for a fastening of annealed wire, are hunting in decidedly the wrong place for the "carrying tone."

The little wedges which secure the neck tightly to the rim in most of the Stewart Banjos should be kept in place properly, and not allowed to become loose or lost out.

I might observe that previous to the use of these wedges, together with the nickel-plated shield or brace, which is screwed to the sound bar in my banjos, that in the majority of banjos the neck was fastened to the rim by screws on each side of the neck, or by a wedge set into the sound-bar.

Since I introduced the shield brace, working in connection with the wedges, some years ago, other manufacturers have taken the idea as a basis for similar devices of their own.

To this I have not the slightest objection; but I have some objection to having my appliances claimed as the inventions of others.

The wedges and shield brace spoken of are not used in the banjeaurine, but only on my Parlor, Concert and Orchestra Banjos.

(The Banjo should always be kept in a suitable box or case when not in use.)

Another somewhat important thing for a banjo player is to acquire some skill in the handling of the pegs, and in tuning the strings of his instrument; but that properly comes under the head of

Observations on Banjo Playing,

upon which subject I shall now endeavor to say a few words.

TIME AND SPACE, it is claimed by some writers on metaphysics, exist only in the imagination—within the mind—and yet I feel that I walk in time and live in space.

I wish that time would allow of my going more into the subject of *playing the banjo*, and that space would admit of a more elaborate and detailed lecture upon this branch of my subject.

But I am permitted to give but a brief outline—only a few observations, at present:

Banjo playing is an art—just as much so as violin playing, piano playing, or singing.

The old time "Hop de doodendo" school of players are passing away. The graceful waltz, polka, schottische, gavotte, concerto and variations on themes, etc., is rapidly superseding the old "Plunk" methods of banjo playing.

A violin in the hands of a scraping and rasping fiddler is not a pleasing instrument to listen to, but sometimes almost infernal. The violin in the hands of the virtuoso is almost supernal. A banjo in the hands of the old time "plunker" is almost as unattractive as the violin in the hands of the rasper and scraper.

And yet the banjo in the hands of a Hall, Huntley, Lee, Powers, Weston, Henning or Shortis produces music so attractive as to have drawn thousands into its sphere.

There is no telling to what an extent perfection in the art of banjo playing may yet be reached.

With suitable books of instruction, and with a proportionate increase in the number of competent teachers, and with suitable banjo literature, banjo playing bids fair to become one of the higher arts.

As time has worked its evolution in the banjo as an instrument, so has it worked its changes in the manner of playing upon it, and in the character of its music.

The old style "stroke," also called "thimble playing," is fast giving way to the guitar style, also called "picking."

The stroke style, the execution of which is done entirely with the forefinger and thumb, was originally the "Old Dan Tucker," "Walk Along, John," plantation negro style of banjo playing; not recognised to day by the higher grades of banjo players, but nevertheless useful in creating a little fun and hilarity, and therefore continues to have a place in the repertoire of many players.

But the stroke style has also developed, with practice, by some players, into a very excellent style or method of executing marches or other music of a military type. To play well upon the banjo "with a thimble" (the thimble covers the nail of forefinger and is used to strike the string), and to execute rapid runs and other effects such as "the roll," etc., is no easy object to be attained; and to acquire skill and dexterity in the use of the thimble, a banjoist must practice as diligently as to acquire the same degree of skill in playing guitar style.

Thimble playing is not, as many of you may suppose, merely a rough, unmusical hammering of the strings and head; but may be developed by practice, into an artistic and pleasing musical performance.

But the number of musical compositions which sound well, or are applicable to this method of performance, are rather small when compared with the compositions and adaptations which are applicable to the guitar style; and the continued practice essential

to acquiring a smooth and pleasing execution of the music is often a damper upon the ardor of the aspiring student.

Nevertheless, I have had the pleasure of hearing some excellent music played with the thimble; but on the whole, I prefer the guitar style of playing.

The guitar style of banjo playing, taught in all modern books of instruction, is the style for the parlor as well as for the concert room.

It is equally well adapted to the lady and gentlemen performers.

In executing music, the little finger of the right hand rests upon the head, and the remaining fingers are used to pick the strings.

The further from the bridge the strings are picked, the softer and more lute-like the tone will be.

The ends of the fingers may suffer at first, by continued practice, from the friction of the strings, and become sore and even blister; but in time they become hard and callous, which is essential to a brilliant execution.

Too much practice at the beginning is not recommended, as it is better to practice but a short time at first, and gradually increase, as the muscles of the arm and the ligaments of the fingers become accustomed to and formed to the work.

The pupil should aim to produce a clear tone, distinct, staccato, and, if raised frets are not used, he should endeavor to finger as accurately (with the left hand) as his senses of hearing and feeling will allow.

The sense of sight is also to be used to a certain extent in banjo playing in order to measure distances —to see the finger-board and its positions.

The senses of sight and feeling may, by practice, be cultivated and developed, just as the mind or muscular system may be developed.

The sense of hearing, especially the hearing of musical sounds, varies greatly in power and extent in different persons, and may, like other senses, be developed and greatly increased in scope by the right kind of practice.

In practice, when tuning your instrument, I should advise against the strong picking or loud sounding of the strings when they are being brought into tune. Any greater volume of sound than is necessary in order to be distinctly heard, is entirely useless, and often tiresome and offensive to the sensitive ear. The hearing may be affected, in some persons, by loud, constant tuning, raising and lowering the pitch of strings, confliction and confusion of sound waves.

The banjo is an instrument that goes out of tune easily; but so is the harp.

Slight changes in temperature effect all the strings, and this fact renders constant tuning necessary. But it may be done in such a quiet way as scarcely to be heard by auditors.

The proper working of the pegs should become part of the early instruction of pupils.

The pegs should be handled gracefully. Do not grasp the banjo neck with the right hand and shove the peg upwards with the left, but take the peg to be tuned, between the thumb and first finger of the left hand, passing the second finger over the top of the peg-head, or scroll; this will allow you to turn the peg with ease, and also afford sufficient pressure to hold it in place.

If pegs are properly tapered and fitted to the holes they are not apt to slip if properly handled.

Machine heads or pegs with cog-wheels, such as are used in most guitars, are about the most provoking and useless article a banjo player could adopt, by reason of being tedious to tune, etc. They are very well for the thick strings of the guitar.

I would also recommend the pupil to sit in as natural a manner as possible while playing. A position which is natural to one person may be unnatural to another.

I would also advise pupils and young players to cultivate harmony in and between themselves, and shun the association of those who have no desire to progress, or those who are constantly at war with good sense and taste, by bragging about their own wonderful talents and of their powers as banjo players, and how they can "knock out" some one else, or "down" this and "drown out" that.

Such people are as useless to you as they are to the advancement of the art of banjo playing. Their arguments are, in many instances, only to be answered by silent contempt, and their egotistical self-esteem and assumption of pomp is frequently based upon, or borders upon idiocy.

The law of affinity, or, "like attracts, like," applies to banjo players as well as to others. Where you find one "knocker" you will find more.

I have been accused of speaking harshly about "ear players," by which is meant those who do not read music, but when I have spoken against the practice of playing by ear, it has been more because I considered it a duty than because I would be benefitted in any way.

It was a terrible thing to think about; all these poor heathens, growing up in ignorance of music, and nobody to put them on the right track for fear of offending their royal highnesses.

So instead of spending my spare cash in sending missionaries to Honolulu to teach the poor heathen there how to be good, like us dear Christians in America, I concluded to do what I could to convert the poor heathen in my own country who were growing up in ignorance of the science and art of music.

I may have made some enemies, but I have made many friends among those who have a natural love for the banjo. It is not always possible to convince a man that it is better to study "regular music" than to attempt to learn to play by "ear," or by "simple method," so callled. It requires some knowledge of music to be able to appreciate it as a study.

Real music is an intellectual enjoyment, far removed from the rough, uncouth "knocking out" style of bar-room banjo players.

It is not always possible to explain to the school-boy how and why the studies of arithmetic and mathematics will benefit him in after life; he does not "see the use of it." Of course not; nobody can understand or perceive anything that is beyond their mental development. But by progressing with his studies the boy learns how to appreciate and understand. Just so it is with music and banjo players. A study of the scales, with practice, and a study of chords, transpositions, etc., develops the mind, and at the same time cultivates the musical ear.

There is no such thing as being really perfect in anything; we are all of us traveling in circles; we see what appears to be the limit of our minds' conception—the summit of our ambition—the fullness of our ideal. But as we approach nearer, it seems to recede, and as we appear to get nearer we find other limits far beyond our previous conceptions. Thus it is with the study of any art or science, music and the banjo included. However high you may have progressed in the art of banjo playing, you may yet go higher.

The banjo has more in it than has yet been brought out, and it remains for you to further develop it.

Study your instrument well; learn all its points; study music; practice assiduously, and aim for the top. Do not be discouraged if you do not progress as fast as you think you should at first, for at each step of the ladder comes redoubled power to proceed.

If you have a friend who is not so far progressed in music as yourself, it is well for you to show him what you can do and how he may follow; or to aid him in his studies and practice; for in so doing you will also learn something new for yourself.

Don't think, if you have learned a new piece, that you are the only one who can play it, or that nobody can get it but yourself; for if you so think you will often find yourself mistaken, and perhaps be humiliated. Only small-minded people are bigoted and egotistical; it remains for you to be liberal. If you think you have ideas of your own, demonstrate them. If you think you have abilities which no other man who walks the earth possesses, show them up—let us see what you can do. But never brag about what you can do; do it first, then, perhaps, if it amounts to anything, you may have friends who will do all the bragging you need.

If you are so constituted that "taffy" is as necessary to your existence as chicken-feed is to a hen, it may be better to employ some able person to follow behind and "taffy" you up every now and then.

But if you are told that you are the "best banjo player in the whole world," don't allow that to puff you up too much, for the same person who tells you that to your face may be so uncharitable as to say, behind your back, that you are the "worst ever heard."

Therefore I advise you to be as even tempered as the musical scale, neither too sharp nor too flat, but of a happy medium.

I have always likened the "ear player" to a mariner who attempts to navigate the deep without rudder or compass. Those who only desire to "play a little," may do as well, perhaps, without notes; but he who desires to progress should learn to, at least, read music.

I fancy that I would rather not listen to a quartette of ear players; if each were to take a different chord at one time it would not be musical.

Those who have studied their chords, scales, etc., have some foundation to work upon, even if they do not play everything from the notes.

A few words more and I am finished.

CONCLUDING REMARKS.

WARPED RIMS.

No machine has ever been devised to save both time and force; one must be gained at the other's expense. Sometimes a banjo rim will have a tendency to go out of shape, or "warp," and it generally happens in banjos of superior tone.

How often we find men gifted with superior talents in one direction and addicted to some degrading habit in another.

Superior talents are often balanced by some defect, either physical or moral, in the person possessing them.

This is so frequently found to be the case that we might almost call it a law of "second nature."

In some of the very finest old violins it has been found that the backs or tops were often made of patched wood. Doubtless many buyers of cheap violins, to-day, would reject such an instrument, thinking it a "botch."

But the real fact is that the time occupied by those old masters in "patching" that wood would have been sufficient to have allowed them to make at least two or three violins in the ordinary way.

Then why did they so make them?

The reason is said to have been because the wood so used contained peculiar acoustic properties which were seldom to be found, and they used every particle of the wood possible.

Horace Weston once told me that in his old Clarke's Banjo the rim "warped" to such an extent that he used to be compelled to block the rim when putting a new head on.

And my experience has shown me that when rims are found to go out of shape it is nearly always in banjos possessing a superior tone; but of course there are exceptions to all rules.

In a large instrument of my manufacture, used by Horace Weston, the rim was found to be considerably "out of round" when brought to me after a year's traveling through the country. I removed the head and after allowing the rim to remain headless over night, found that it had come back to its circle without mechanical aid. So it has been with others.

But some rims will go a little out of shape and stay there, and if the banjo sounds well I recommend their being left just as they are.

In some of the highest-priced guitars the wood is so light and old, and blockings so delicate, that no artist possessing such an instrument would think of allowing it to lie around without a case, or of taking it out of a hot room into the street in the depth of winter. For if it were so used it would speedily crack and become worthless. A banjo player should be as careful of his fine banjo as a guitarist of his guitar, or a violinist of his violin.

Various devices have been formed for the purpose of holding banjo rims round, but it is nearly always the case that form is retained at the expense of tone. For, as I said before, some of the best sounding banjos are those with rims out of shape.

One mechanic will insert a steel (cast) ring inside the rim to hold it round; another a thick band of wood, and another will think that a banjo should have a brass head and steel strings; but, as for myself, I prefer the sensitive rim with a good tone; and if I had a rim not more than a half inch out I should not

bother about it; but if the rim was eleven inches one way and thirteen the other, when it should be twelve inches "all ways," I should have it fixed.

WARPED NECKS are worse than warped rims; they affect the entire instrument, and if I must have either I prefer the warped rim.

A neck may warp downwards and cause the strings to jar upon the finger-board. It may spring upwards and cause the strings to lie too far away from the board, thus making left-handed fingering very much more difficult.

Necks made with thick finger-boards frequently act in this way, owing to the different shrinkage capacities of the woods used in the neck.

Some makers claim that if the wood is well seasoned the necks will not warp or spring; but this is a fallacy, as some woods, particularly certain grades of walnut, never season so as to be free from warping.

Other makers claim that if the wood is cut so that the grain runs in a certain way that the necks cannot warp; but this is another fallacy; for the necks so made will warp sideways or twist; just as readily as the same wood would warp in another direction if differently cut.

Only long experience and observation will teach a manufacturer how to avoid these troubles with banjo necks, which, owing to greater length, are more liable to warp than the necks of other instruments.

Again, some players demand necks made so extremely thin that they lack sufficient firmness to stand the strain of the strings, etc.

HEADS.

When I first went into the business I used to hear considerable about "slunk heads," but I don't hear much about them any more.

Banjo players must be becoming more enlightened, or else a more intelligent class of people is taking hold of the instrument.

Banjo heads are made from the skins of young calves. "Slunk heads" are supposed to be those made from the skins of calves so young as never to have seen the light—that is, still-born calves. Such heads are worthless on a banjo.

Choose a good stiff, partly white head, one of even thickness. When you put it on the rim wet it enough to make it pliable. Let it get well dry before straining.

It does not matter how wet the head is, providing you give it time to dry thoroughly before putting it to a strain; but the wetter the head is made the longer it will require to dry.

Indirect sun-light, in the open air is the shortest and best way to dry a head. The weather, of course, must be clear when exposed.

Some amateurs have a predilection for heads that are all transparent (such skins used to be used in place of glass, for windows, in olden times), and others think only such as are "all white" can be good; but the knowing ones, *i. e.*, experienced players, select their heads with regard to other properties than color, knowing that artificially prepared heads are often weak in strength as well as in sonorousness. The head is the most sensitive part of the instrument, and the more uniform in density the air, and the less variable the climate, the better.

And now for the lack of those important factors, time and space. I must close, hoping to go deeper into the subject at some future time, however remote.

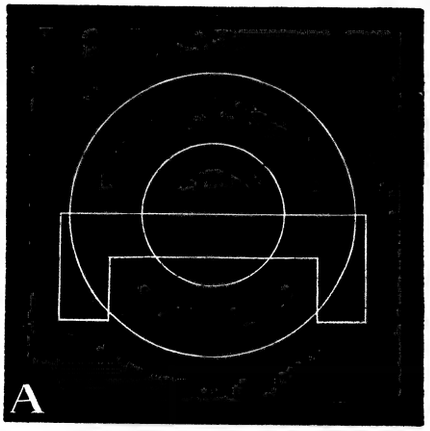
NOTE.—The foregoing lecture is given just as originally written; with perhaps many imperfections, errors and omissions. It is scarcely possible to cover the ground of such a subject in a few words and at the same time be clear and comprehensive; and at present I have not the time to devote to a more elaborate and detailed analysis of the various points introduced; neither have I the desire to employ any one to "write up" my lectures or other articles, from memoranda supplied by myself, as is done by many.

Therefore, the lecture, such as it is, is given to the public just as it proceeds from my pen—without elaboration—without any pretention to rhetorical style, and I hope without perplexing mystifications.

In short, what I have said, is intended for the rising school of banjo players—*banjoists*, notwithstanding the omission of the word from Webster's dictionary—not for the critics.

THE BRIDGE.

The following cuts, or diagrams, give in outline the size of bridges generally used on the banjeaurine and banjo.



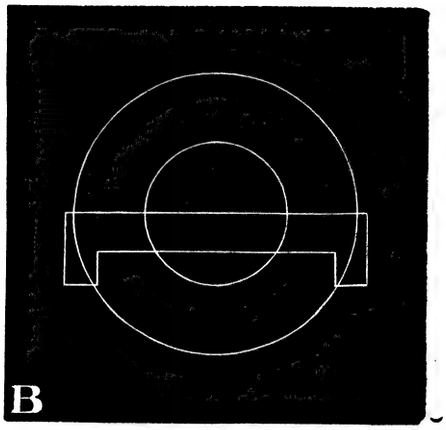


Diagram A, represents the banjeaurine bridge; Diagram B, the banjo bridge.

Taking the centre of the bridge as the place to notch for the third string, we make a circle from this centre for the positions of the two outer strings, and then setting the dividers one-half shorter, we form another circle from same centre for the two remaining notches.

AN EXPOSITION OF THE

HARMONIC TONES

USED IN BANJO PLAYING,

AND THEIR PHILOSOPHY.

HARMONICS are the sounds produced when a string is subdivided into its aliquot parts.

We will call the twelfth (12th) fret the dividing line between the nut and the bridge. This fret divides the string into two equal lengths. Hence, when the string is "stopped" at the 12th fret, only its half—or that section between the 12th fret and the bridge—vibrates when struck, and the note produced sounds an octave higher than the open string (or entire length of string).

It must be understood that when we speak of the "entire length of string" we do not mean to include any of that portion which extends beyond the nut and bridge, for at these points the vibration ceases to exist.

Now, instead of stopping the string, that is, pressing the finger upon it firmly at the fret—should we merely touch it lightly with the finger, the tone produced is called a harmonic. The harmonic produced by gently touching the string at the 12th fret is the same in pitch as if the string were stopped at that fret in the usual manner; but the character or quality of the sound produced is entirely different, for instead of one-half the string vibrating, as would be the case were it pressed down firmly at the 12th fret, the string, immediately upon being touched, subdivides into two vibrating sections or segments—the entire string vibrating from the nut to the 12th fret, and there having been formed a *node* at this fret, the vibration there ceases, but continues again from the 12th fret to the bridge.

NODES.—The points between which a string vibrates are called "nodes," or nodal points. Hence, if a string is set in vibration in its entire length, the *nut* and *bridge* are the nodes or points at which it is quite or almost stationary.

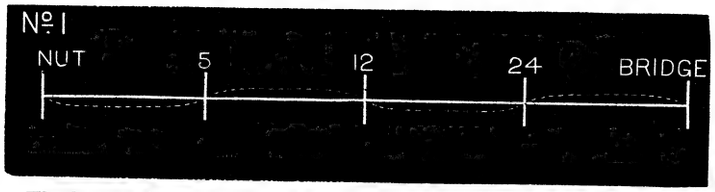
When a harmonic stop is made at the 12th fret the string neither vibrates as a whole, nor as a half, but subdivides into two equal sections, each of which vibrate twice as fast as the open string.

Touching the 5th fret gives the harmonic tone an octave above that produced by touching the same string at the 12th fret; but if the string is stopped or pressed against the 5th fret in the usual manner, the note produced is of an entireiy different pitch.

This is a matter which has puzzled many students and young players, and even among more advanced players it is not generally understood.

Now we will assume the "open string" is A. If we press it at the 5th fret, which is one-quarter the distance between the nut and the bridge, we allow three-quarters of the string to vibrate, and the note produced will be a *fourth* higher than the note made by the open string, and as the open string is A, this note, as is plain to be seen, must be D; but the *harmonic* tone produced is not D, but A, two octaves higher than the open string. For the string, when lightly touched at the 5th fret, subdivides itself into four equal segments, each of which vibrate, and thus form the harmonic tone.

It follows then that the four nodal points of this harmonic must be at the frets, which make the four divisions of the string. These are the 5th, 12th and 24th frets or divisions of the string, and if the string is touched at the place where the 24th fret should be the harmonic tone produced would be the same as at the 5th fret, for the 5th fret falls at the same distance from the nut that the 24th fret does from the bridge. Hence, from the nut to the 5th fret is one section; from the 5th to the 12th fret is another section; from the 12th to the 24th fret is another section, and from the 24th fret to the bridge another, thus making the four sections or segments, as per the following diagram:



The harmonic tone produced by touching the string at the 7th fret is found to be the same note that is produced by stopping the string in the usual manner at the same fret, with the exception that it is an octave higher in pitch.

When the A string is stopped at the 7th fret, which is ⅓ the distance from the nut to the bridge, it follows that ⅔ of the entire length of the string will be used in making the note, and the note produced will be E, which is a fifth higher than A, the open string.

But when the harmonic touch is given the string at the same fret the string subdivides into three segments, each of which vibrate, and the harmonic tone produced, as has been said, will be E, but an octave higher than the ordinary note produced at same fret. The three sections into which the string divides are between the nut and 7th fret, the 7th fret and 19th fret, and 19th fret and the bridge, and its nodal points are the nut, bridge, 7th and 19th frets. The same harmonic tone may be produced at the 19th fret as at the 5th fret.

As we have as nodes the nut, bridge, 7th and 19th frets, and there being three segments, and the same rule applying to each harmonic tone, it follows that we must always have just one node in excess of vibrating segments; that is, providing we classify the nut and bridge as nodes in speaking of harmonics; if not, then the reverse is the case and it becomes apparent that there is always one vibrating section in excess of the number of nodal points.

The above rough diagram will serve to convey the idea of the three vibrating segments and nodal points.

Before proceeding further it is here well to state that the student who closely investigates may discover that the 19th fret on his banjo is perhaps not exactly the same distance from the bridge that the 7th fret is from the nut. This, however, does not by any means prove that his instrument is not fretted correctly, inasmuch as the fretting measurements are to a certain extent "tempered" to correspond to the scale of the piano. This, however, will not affect the harmonic tones, the somewhat broad surface of the finger covering or touching more of the string than the little difference in the position of the frets.

The greatest possible difficulty in the way of the student lies in the frequent impossibility of procuring absolutely TRUE STRINGS, for nowhere is the falsity of tone in a string so quickly perceived as in harmonic tones. The reason for this is apparent in the fact that if a string is of uneven thickness or unequal in weight from the nut to the bridge, when it divides into aliquot parts, each of the segments may give a different tone and result in producing only an unmusical discord in place of a harmonic; or such a string may refuse to respond to the harmonic touch at all.

The three positions thus far named for producing the "natural harmonics" of the string, *i. e.*, the 12th, 5th and 7th frets are those most used by banjoists, and generally considered the most perfect; indeed, some writers upon stringed instruments go so far as to claim that the other harmonic tones are imperfect, and their use not to be encouraged.

We will, however, speak of the harmonic produced at the 4th fret.

When the string which we have called A is stopped at the 4th fret, the tone produced is a *major third* above the open string, one-fifth (about) the string being stopped off and the remaining four-fifths vibrating.

By giving the string the harmonic touch at the 4th fret the harmonic tone produced is found to be the same as the natural note produced by stopping the string at that fret, only that it is an octave higher. The string when touched at this fret subdivides into five segments in a manner similar to that previously explained. The frets forming the nodal points for this harmonic are the 4th, 9th, 16th and 28th. The same harmonic may be produced at any of these positions.

NOTE.—Harmonic tones in musical notation are generally written an octave lower than they sound. That is they sound an octave higher than written.

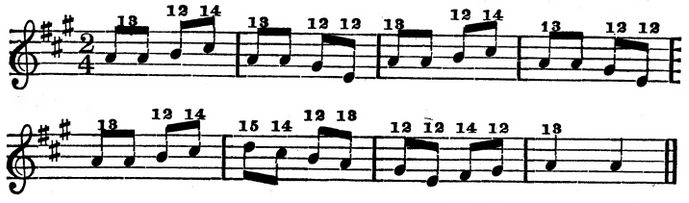
The foregoing has briefly illustrated the most important of the natural harmonics used in banjo playing. We shall now have a few words to say about artificial or

STOPPED HARMONICS.

As the 12th fret divides the string from the nut to the brldge and produces the clearest harmonic tone, it follows that if we stop the string at the *first* fret the 12th fret will no longer be the middle of the string, but instead the 13th fret must take the place of the 12th, and can then be made to produce a similar clear harmonic. But, says the pupil, "Since I have to use my left hand to stop the string on the 1st fret, how am I to make the harmonic touch at the same time?" This can be done in the

following manner. Touch the string at the desired fret with the tip of the first finger of the *right hand* and at the same time pick the string with the *second finger of the right hand.* Thus using the one hand only to make the harmonic touch, and at the same time pick the string. This of course will require some little practice. Any simple melody can in this way be played in harmonics.

The tune "Yankee Doodle" being appropriate for this purpose, and at the same time so well known, we have selected it as an example for illustration.



The figures over the notes stand for the frets at which the strings must be touched to produce the harmonics of the notes indicated. Otherwise the notes are stopped with the left hand precisely the same as though the melody were to be played in the ordinary manner without harmonics.

OBSERVATIONS.

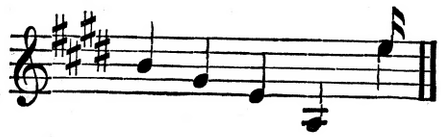
It is said that Paganini's performance of harmonic tones upon the violin was so marvelous that he astonished many of the great virtuosi of his day. He would produce the most rapid passages in harmonics where ordinary players would scarcely believe their production was possible. So much for *musical genius.* Such playing cannot be taught nor acquired *by rule*—it must be *in the man,* just as it was in the great Italian masters who painted the famous pictures of the world. Mathematical rules are very good as far as they go, and a grounding in the rudiments is a great assistance, not to say indispensable, but as we have frequently said, will not produce the *artist,* any more than a chicken can be hatched from a stone. Talent may be cultivated, nursed and trained, and genius may be developed, but musical or mathematical rules cannot be laid down to make an artist or musical genius of every man living.

We have heard Horace Weston, the world-famed colored banjo player and musical genius, play variations on "Home Sweet Home" and the "Carnival of Venice" in harmonics, in a style and with an effect scarcely believed attainable by many players; producing, as did Paganini on the violin, harmonic tones throughout the entire compass of the banjo. Such playing cannot be acquired by everyone, and rules for its practice are possible only to a certain extent, after which genius must lend the artist wings to soar aloft if he ever expects to reach such a height in musical execution.

The few plain and simple directions given in this brief article on HARMONIC TONES, it is hoped, may assist many in acquiring some knowledge of the philosophy of this department of music and banjo playing, and open to them the way to acquiring a better conception of the powers and possibilities of the instrument, after which there is no telling to what degree of perfection some of our students may attain. A study of the rudiments and the philosophy of music and its principles as applied to their favorite instrument can, at least, be no draw-back to their advancement—even if it should not prove an infallible guide to success.

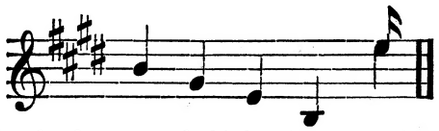
The first recollection we have of hearing harmonic tones played on a banjo was some years ago by a banjoist in his "swinging act" or "Bell Chimes imitation." This is a favorite banjo performance with which many of our readers are doubtless familiar. It consists of a melody played in imitation of a set of chime bells, which are so familiar to those in the vicinity of our own business location (the old Christ Church Building at Second and Church streets, frequently chiming its bells). The fifth, or short "E" string on the banjo which by some players has been considered like the "fifth wheel to a wagon," is really indispensable in playing this chimes imitation, and with the raising in pitch, one tone, of the "bass" or wound string, we have a combination of tones on the open strings, which are just what is needed for this particular piece.

It is known to those of our readers who have made any advancement in banjo playing, that the "open strings" of the banjo when tuned in the usual way correspond to the following notes:



That is, the strings are so noted in music, but when tuning the instrument to play with piano or guitar, they are tuned a minor third (a tone and a half) higher than this, as otherwise the instrument sounds flat. (In reality the banjo sounds an octave lower than this, but that is of little moment, as the guitar likewise sounds an octave lower than the notation indicates, so also does the male voice in song.)

Now, by elevating the bass string a full tone, we see that the notation or pitch of the strings is changed, thus:



And by picking the first, second, third and fourth strings in succession, we have the notes which form the principal part of the one-hand "swinging solo," and it is quite easy to swing the banjo with the left hand, and at the same time pick the strings with one of the fingers, in the order named. As will be seen, these notes, taken collectively, form the common chord of "E," and the open strings, when sounded together, produce harmony, which would not be so were they sounded with the fourth string a tone lower. Hence, with the "Bass to B," harmonics in the key of "E" are more readily obtained, and chords which are difficult to finger in the usual tuning become easy with the "elevated bass." But an obstacle to this manner of tuning is the increased strain upon the fourth string, which is composed of thin strands of silk spun over with fine silver-plated copper wire. This silk cannot be twisted nor braided, but must be used in strands, and is held tightly together by the wire wrapping. Now, it will be noticed, that when a banjo of, say eleven inch size, is tuned to "C and G" (fourth string to C, third to G) the fourth string is already about as tense as it should be to withstand the action of the thumb in playing, and this raising in pitch of a tone is a severe and unnatural strain on this string, which is apt to stretch out of tune and become flat during a performance. One way to remedy this is to tune to a lower pitch; another way is to use a banjo with a shorter neck; either way will lessen the strain on the string. By substituting a string wound on thin steel wire for that of silk we have a string that will withstand the strain, but this must be done at the expense of tone, for the steel string is too stiff and not sufficiently elastic to give the vibration of the silk-wrapped string, and from its lack of elasticity can, by a strong pick, be flattened readily in pitch, and is also much more difficult to tune correctly; the slightest alteration in tension causing a great change in its pitch. Hence, steel bass strings are not a favorite with banjo players, and decidedly not a success.

THE ADVANCE OF THE BANJO.

The advancement in the art of banjo playing cannot be better illustrated than by the constantly growing demand for a better class of banjo music.

We note the *decrease* in the demand for comic banjo songs, which a few years ago were classed as "banjo solos," and the *increase* in the demand and growing popularity of instrumental selections, such as Waltzes, Mazourkas, Schottisches, etc., with piano accompaniment. The *Waltz* for banjo and piano is the parlor favorite, and banjoists do well in cultivating a taste for such music. We have lately added some beautiful selections in this line to our Catalogue, which is the largest of any publisher of banjo music.

Teachers throughout the country who do not advertise in the *Journal* are simply working against their own interests. The publisher of the *Journal* cares little for the small sum he may receive from any teacher whatever for his ad. in the paper, but the teacher cannot afford to be without it. Those who have tried it know this is a fact."

A FEW OF THE TERMS USED IN BANJO MUSIC, AND THEIR MEANINGS.

ALLEGRO—Quick, lively.
ALLEGRETTO—Not so fast as Allegro.
ANDANTE—Slow, graceful, distinct, peaceful,
DIM.—*Diminuendo*—Decreasing in power of sound.
CRES.—*Crescendo*—An increase in the power of sound.
RIT.—*Ritardando*—Going slower.
M. F.—*Mezzo forte*—Moderately loud.
FORTE—(Expressed thus, *f*), loud, strong (*ff*, very loud).
PIANO—(" " *p*), soft, low (*p p*, very soft).
DOLCE—Sweet, or in a sweet style.
A TEMPO—After *Rit.*, etc. Return to the original time.
ACCELERANDO—Accelerating. The movement is quickened.
D. C.—*Da Capo*—Back to the beginning.
FINE—The end or close.

HOW TO PUT
A HEAD ON A BANJO.

PRACTICAL INSTRUCTION IN A MATTER WITH WHICH EVERY BANJO PLAYER SHOULD BE FAMILIAR.

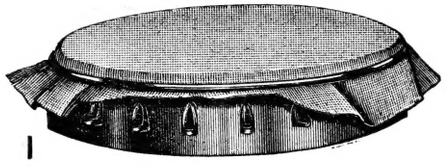
We have in various publications and on different occasions explained in as clear and concise manner as circumstances would permit, the manner of properly re-heading a banjo. But, at the same time, we have said that the matter of re-heading a banjo, like any other art, requires some experience and practice to properly acquire and become proficient in.

Now, in order to give our readers a somewhat clearer view of the operation, and wishing all to have as clear and practical instruction as can well be given without personal contact with them, we have taken occasion here to go over the subject of

PUTTING ON A HEAD,

accompanying the explanatory remarks with a few wood engravings made from photographs of the work in the different stages of the operation.

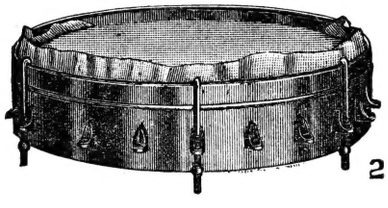
We might remark here that it is owing to the number of letters asking for these particulars that we have attempted to illustrate the subject, deeming the printed instructions formerly given insufficient to meet the wants of our customers.



1

The head, or skin, should be wet enough to make it pliable—but not soaked until it becomes too flabby. Therefore, to properly wet the head, roll it in a wet towel for two or three minutes, or immerse it in a tub of water for a short time. Some heads will become pliable in a few seconds of wetting, while others require as many minutes.

The head that is most impervious to water and requires the more time to become pliable, will make the best head after it becomes dry, as it will not be so ready to become slack in damp weather as the more pliable head.



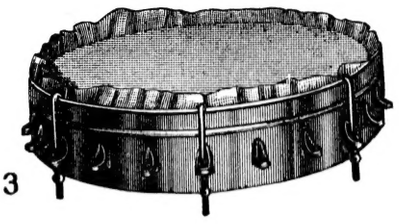
2

After the head has become sufficiently pliable, lay it on the rim of the banjo and place the wire ring, or "flesh hoop," over the head, thus bringing it down over the rim as shown in the first illustration. Be careful to draw the head evenly and have as few wrinkles in the skin as possible.

If the wire ring (flesh hoop), is of iron, it is better to give it one or two coats of shellac varnish—well dried—or else to cover it with thin muslin over the varnish. This will guard against rusting.

Every banjo player who wishes to put on his own heads (banjo heads, of course), should provide himself with SIX LONG HOOKS to be used especially for this purpose, as shown in cuts Nos. 2 and 3.

Keep the wire hoop near the top of the rim and as even as possible; then, taking the hoop or band in one hand, tuck the edge of the head under the hoop and put on a long hook to hold the band in place. Now, tuck in more of the edge of the head, going around the rim, and put on another hook; do this again, going further around the rim, and your work has assumed the appearance of cut No. 2.



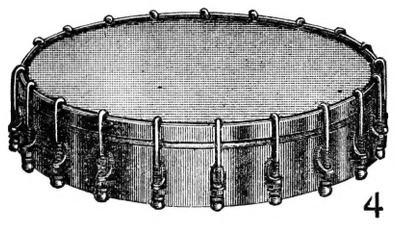
3

Proceeding with the work, put on a hook here and there as the head is tucked up, and after the entire circle has been gone around, take a pair of pincers and carefully pull the edge of the head tight and smooth (cut No. 3). But do not pull too hard, so as to tear the head. Try to have the head perfectly even and free from wrinkles, and the hoop pretty well up above the edge of the rim.

Now begin putting on the hooks and nuts which rightly belong to the instrument, and finally remove the six long hooks, replacing them with the others.

Care must be taken that the head has not been drawn down or strained during this process, but the nuts on all the hooks left merely tight enough to hold them all in place. Now, with a sharp knife, trim off all the circle of superfluous head—but be very careful not to cut the head and spoil all the work, just as you think you have it done.

After the edge of the head has been trimmed off the work will assume the appearance of cut No. 4.



4

Of course, the edge of the head may be trimmed off before the long hooks are removed and the full line of hooks put on, if desired. But for a novice in the art of putting on heads we advise the former method.

If the weather is clear and the air dry when this work is done, the head will become hard and dry in a couple of days, and the head can then be "pulled down," that is, you can take the wrench and tighten all the hooks evenly and thus gradually draw down the head.

It is to be remembered that although with favorable weather a head may appear to be perfectly dry and firm on its surface in a few hours after it is put on, yet that portion of the head which is under the hoop has not by any means become dry, and therefore should not be strained.

It is quite possible after all this work has been gone through with to break the head in pulling it tight.

The head will require constant tightening now for a few days until the greater part of its stretching qualities have been removed, and it is quite possible that it may break. No one can be an infallible judge in regard to the lasting qualities of a head; the best makers and players of a banjo being frequently deceived in them.

It is quite impossible to get any two heads precisely alike. They may be selected of the same color and thickness, and same evenness of finish, and yet when they are put on be found to work differently. It does not matter whether a head is white or clear (transparent) so long as it is a good head.

A good head may be broken by accident and need replacing.

No matter how good a head may have been, when once broken, it is done for—there is no use in patching it.

A good banjo may sound dull on account of having a poor head, or one which has been loosely put on and cannot be properly stretched.

The head is a ready absorbant of moisture at best, and a poor flabby head which has been improperly manufactured is a curse to a fine banjo. Any banjo will contract the "malaria" with such a head.

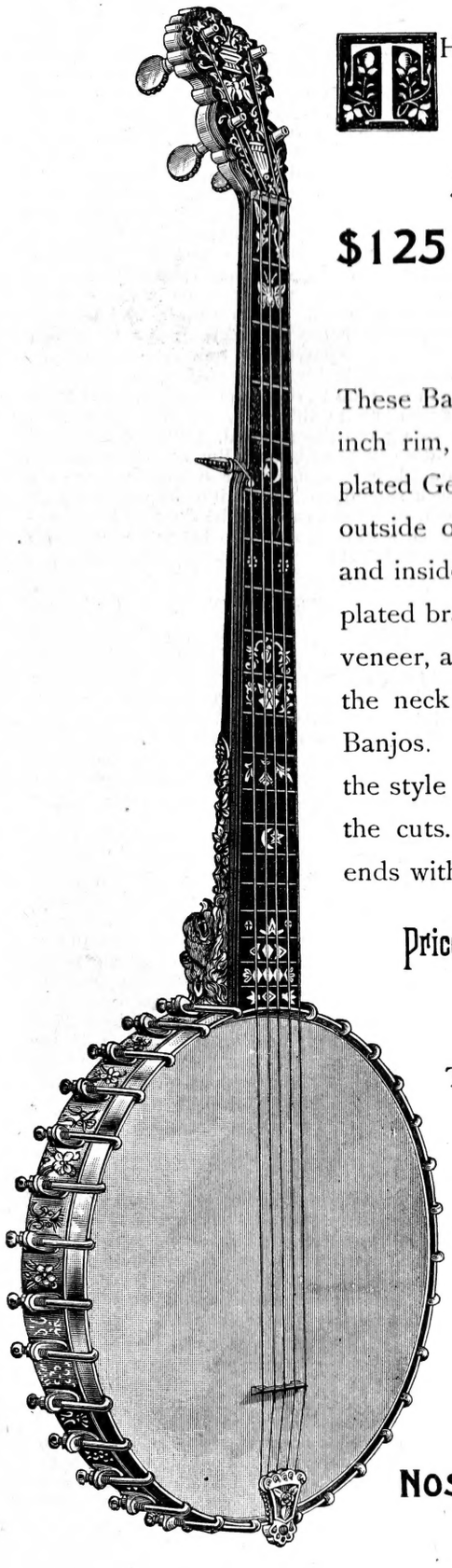
Do not strain a banjo head very tight until it has become dry and firm.

The sun is the best head dryer, much preferable to a stove. When the weather is clear, the rim with newly placed head can be placed in the open air, exposed to the sun's light for a short time. But if the weather is very hot, with an intense sun heat, it is better to place the work so that the sun does not shine directly upon it—or, in other words, place it out of the direct rays of the sun, and yet in such position as will allow the dampness to be absorbed. Should the sun shine or heat fall directly upon the head and it thus be made to dry too quickly, it *contracts* and draws firmly upon the still wet or damp part of the head which is around the wire hoop and under the hoop or band, and is thus unnaturally strained and frequently caused to break.

A head which has been strained very tight before becoming thoroughly DRY, will not last as long as if it had been allowed time to become dry before being stretched.

Putting a wet towel on a head after it has been put on in order to keept it wet and cause it to stretch, is a very bad proceeding. Heads treated in this way will not last so long as they would if allowed to stretch gradually.

Sometimes a head will last for years. Then again, two or three heads may be broken, one after another. Some players think it is like "Fisherman's Luck" to put on a head.



THESE Engravings represent front and back views of

S. S. STEWART'S $125 PRESENTATION BANJO.

These Banjos are very fine in tone; size, 11½ inch rim, with 19 inch neck. Rim is of nickel-plated German Silver, with maple wood inside, outside of rim is handsomely engraved, or chased, and inside is finished in Mosaic. There are thirty gold-plated brackets. The neck has several layers of colored veneer, and ebony top [finger-board]. The carving on the neck is the finest work of the kind ever done on Banjos. The pearl inlaying is very fine also. An idea of the style of carving and pearl inlaying may be had from the cuts. The pegs are of ivory; they are capped on ends with gold and set with small garnets.

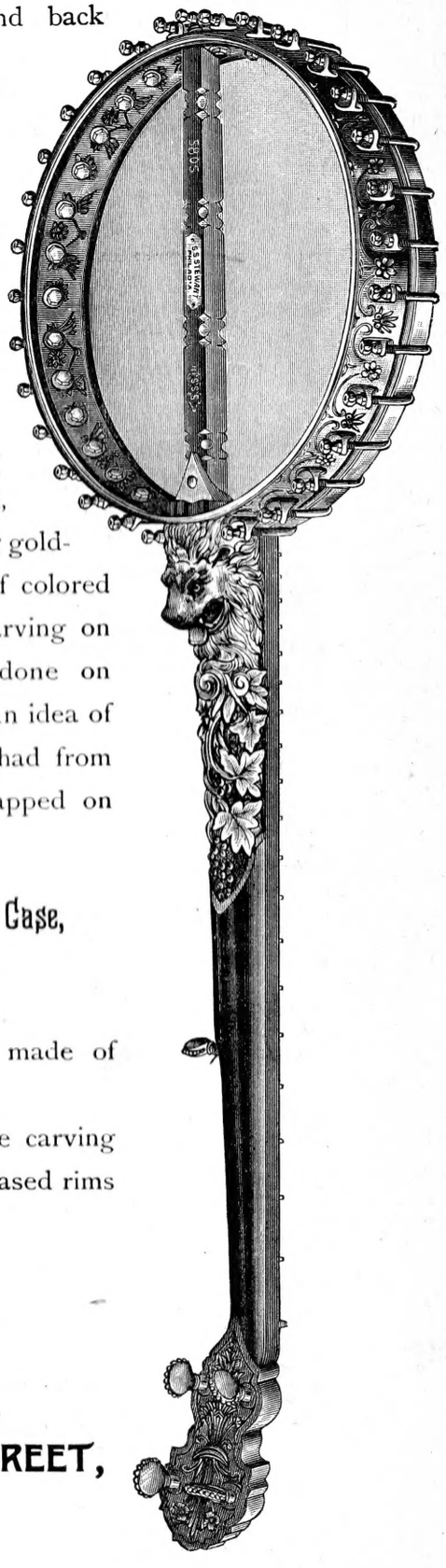
Price of this Instrument, with Fine Leather Case,

$125.00

These instruments have **raised frets**, made of best German Silver wire.

Other styles with the most elaborate carving and inlaying and with gold-plated chased rims and hoops will be furnished from

$150 TO $300.



S. S. STEWART,

NOS. 221 AND 223 CHURCH STREET,

PHILADELPHIA, PA.

together with the ebony log (which is sawed into strips) and other veneers becomes a banjo neck in reality. Sometimes the wood which goes into the factory in the shape of a plank, comes not out in the shape of a neck for three years or more. The time required *must be* weeks, it *may be* months, and sometimes *is* years. For it is ever the aim of the manufacturer of the celebrated Stewart Banjo, to turn out the best work and the best and most perfect toned banjo in the world. The Stewart Banjo is recognized as such and no pains will be spared to maintain its high standard of excellence.

The standard banjo neck of the present day is 19 inches in length—that is, if there is any such thing as a "standard" in the length of banjo necks—and the width and thickness varies according to the tastes of manufacturer and performer. Now, the length of vibrating string—that is, the distance between the nodes, or from the nut to the bridge, governs entirely the measurement or relative distances of the frets. Hence, if a banjo neck of 19 inches is put in a rim of 12 inches (in diameter), the length of vibrating string will be one inch more than if the same length of neck is fitted to a rim of 11 inches; and should a 19 inch neck be fitted to a rim 13 inches in diameter, the length of vibrating string, will, of course, be an inch greater than with the 12 inch rim. Hence, with the same length of necks but with rims of different diameter, the measurement or relative distances of the frets must be different. The frets on the 12 inch rim banjo will be wider apart than on the 11 inch rim banjo; and the frets on the 13 inch rim banjo will be further apart and more difficult to finger than on either the 11 or 12 inch rim banjos.

We are now speaking briefly and merely generalizing upon the subject. Of course it would be possible to write many hundred pages on the subject were we to undertake a complete or only partial analysis of its various parts.

Now reverse the operation: Keep the rim of one size and vary the length of necks and we have the same result, only that with lengthening the neck, and thereby increasing the length of string, we are enabled to get an additional note or notes upon the neck, whereas by increasing the length of vibrating string by raising the diameter of the rim we are apt to have less notes on the neck (finger-board) and are compelled to stop the string upon the head, over the rim of the banjo to produce notes, which in the other case fall upon the neck.

A banjo made with a very small rim and long neck, such as Stewart's "Banjorett," will have many more frets upon the neck or finger-board than a banjo made with a large rim and short neck, although they may each have the same length of vibrating string.

EXAMPLES.

A player who has been using a banjo of 12 inch rim and 19 inch neck, similar to Stewart's "Orchestra" Banjo, thinks it is too hard for him to finger, so desiring a shorter neck, he has the 19 inch neck replaced by one of 18 inches. Much to his surprise, he finds the instrument scarcely any easier to finger. Why is this?

Simply because the string has been lessened only *one inch* by the neck being one inch shorter, and this one inch being divided among the frets of the entire scale, makes so little difference in their relative measurement or distances, that the 19 inch neck might just as well have remained.

The length of string having been decreased by one inch causes the 12th fret—which is the middle of the string, and must be equi-distant from the nut and bridge—to lie one-half inch nearer the nut, as a matter of course. The 5th fret being one-quarter the distance between the nut and bridge and one-half the distance from nut to 12th fret, will be one-quarter inch nearer to the nut. Hence, it is to be readily seen that such a small decrease in the relative distances of the frets and positions can scarcely render the instrument much easier to finger. Then what is the remedy in such a case? He has his choice of two remedies, one of which is to adopt raised frets, which will render the fingering much easier, and the other is to use a smaller banjo. He must either do this or else endeavor by practice, to render his fingers more supple and flexible.

There is a remedy for each and every evil in the world, but before you undertake to remedy an evil be sure that it is an evil that you are attempting to remedy, and be likewise sure that the remedy is the right one. For there are those who have had their banjo necks replaced by shorter ones, and again there are those who have had their banjo necks replaced by longer ones, and in neither case been any better off.

It isn't the length of neck that makes the banjo player; not always, at least. Nor is there any good reason why a banjo player should torture himself by working at a longer neck than nature has adapted him for.

FRETTING, ETC.

In fretting a neck with raised frets, care must be taken that the saw used will make a cut to fit the wire. It must not be loosely put in, for if so, it is apt to work out. Then again, if the saw cut is not sufficiently large the frets are apt to cause the neck to spring downwards on being driven in, acting like so many small wedges and forcing the neck to bend slightly.

If a neck warps or bends downwards, the strings will clank on the frets, and if the neck is much "out of true," it becomes impossible to perform upon it.

But if the neck is sprung upwards and is hollow, so to speak, the strings will lie too far off the finger-board along the surface of the neck, and it then becomes difficult to finger chords, to say nothing of the false notes produced by the *change in tension* of the string in bringing it down upon the fret.

If the "open" strings on a raised fret banjo jar or clank, it is generally the case that the nut (or the notches in the nut) are cut too low. A new nut is the best remedy.

If the strings when stopped on any particular fret, jar or clank against the next fret instead of making a clear tone, it may be that the bridge is too low. If the bridge is of a proper height, it may be that one or more of the frets have sprung out and is higher than the lower fret at which the strings are stopped. The surface of the frets should be on a level always.

When a "straight-edge" is placed over the neck on the top of the fret board, should it not rest perfectly straight it will generally be found that the neck is not true. If made true in the beginning it has likely sprung or warped. This is often found in banjos carelessly made—especially in cheap instruments, but sometimes happens in instruments of the very best manufacture.

A walnut neck, with ebony face, is apt to warp on account of the different shrinkage capacities of the two woods. The same may be said of rosewood necks, which are very treacherous. But some players are so careless and clumsy that almost any neck would warp in their hands.

REPAIRING A WARPED NECK.

When a neck is found to have warped, if it is still in the manufactory, it is placed away for a time in order to await further changes in the wood, as it is not safe to repair such a neck and make immediate use of it. But if, on the contrary, such neck is in the hands of a performer and it thus becomes necessary to repair it immediately, the following course may be pursued:

First remove all the frets, if it is a raised fret instrument. Next ascertain, with the aid of a perfectly true straight-edge or leveling rule, just where and how much the neck is out of a line. If not too great, the neck can be "trued up" perfectly straight with sand paper blocks, that is, sand paper placed upon perfectly level blocks of wood. This cannot well be done by machinery, as great care must be taken with the work. After this is done, the finger-board can be finished up and new frets put in.

In case the neck is too badly warped to be leveled up in this way, the strip or veneer, forming the finger-board, must be taken off and a new one put on. But as such processes are likely to cause some trouble in case the neck should warp back into its original position, such work can only be done by an experienced workman, and it is better to send such instruments to Stewart's factory for repairs.

PEGS.

Stewart generally introduced ivory pegs (made from walrus tusk) in banjos, in the year 1879, from which time such pegs became popular among banjo players, and in demand.

Walrus ivory makes a handsome and durable peg for banjos, but as a matter of course, such pegs are brittle and easily broken if struck or from a slight blow, etc.

Of late there have been excellent imitations of the ivory pegs made in celluloid, a composition which is not so liable to break, and which has all the appearance of ivory, and therefore is equally as good for the purpose. Wood pegs, made of ebony or box-wood, have been in use for many years, and it is not to be supposed that their use will ever be entirely superseded by either celluloid, ivory, or other styles.

It is generally conceded however, that a light color peg, such as bone or ivory, has a better appearance, owing to contrast, in a neck with black finger-board, than those of dark color.

FITTING PEGS,

The holes for pegs are to be bored in the "peg-head" or "scroll," with a drill somewhat smaller than the end of the peg, and then reamed out with a taper-reamer made to the same taper as the peg to be fitted; otherwise, the peg cannot fit the hole, and it becomes very hard to correctly tune the banjo.

SLIPPING PEGS.

If pegs, which are properly fitted, slip, or do not work easily, try a little chalk on them with perhaps a drop of oil. But do not rub rosin on them—reserve the rosin for a slipping BRIDGE.